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Vol. II MARCH, 1918 No. 1

THE AMERICAN REVIEW OF TUBERCULOSIS

JOURNAL OF

THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS

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PUBLISHED MONTHLY

AT 2419-21 GREENMOUNT AVE., BALTIMORE, MD.

BY THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS

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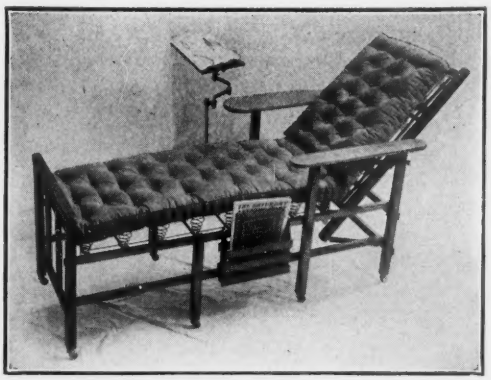

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THE AMERICAN REVIEW OF TUBERCULOSIS is issued monthly about the 20th of the month. Each volume consists of approximately 700 pages. The volumes begin with the March number.

The subscription price of the REVIEW to members of The National Association for the Study and Prevention of Tuberculosis is $2.00 per volume, and to non-members of the National Association, $3.00 per volume. Twenty-five cents extra should be added for Canadian and fifty cents extra for foreign postage. Subscriptions may be sent to 2419 Greenmount Avenue, Baltimore, Md., or to The National Association for the Study and Prevention of Tuberculosis, 105 East 22d Street, New York City. Checks should be made payable to William H. Baldwin, Treasurer.

Manuscripts should be sent to the office of the Managing Editor, Dr. Allen K. Krause, Johns Hopkins Hospital, Baltimore, Md. Manuscripts should be typewritten on one side of the page only. The publishers will not be responsible for manuscripts lost in transit. In order to save expense for authors' corrections in proof, the manuscripts should be carefully revised by the authors before submission.

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THE PROGNOSIS AND TREATMENT OF TUBERCULOUS LESIONS OF THE LARYNX[1]

JULIUS DWORETZKY

From the Municipal Sanatorium, Bureau of Hospitals, Department of Health, City of New York, Otisville, New York

Tuberculosis of the larynx is invariably secondary to tuberculosis of the lungs and should therefore be considered as a complication of the latter. The prognosis in laryngo-pulmonary tuberculosis depends not only on the condition of the larynx and lungs, but also on all other elements that may have a modifying influence on the patient's condition. Only after a careful consideration of all factors concerned may we hope to arrive at an accurate prognosis. The prognosis may be discussed in regard to first, life, and secondly, voice. As a rule both are intimately connected, except in chronic cases, where the voice may remain affected while the length of the patient's life is generally not influenced.

PROGNOSIS

The factors that determine the prognosis as to life are:

1. The pulmonary condition. The character and extent of the pulmonary lesion should be carefully studied. The chronic type of pulmonary tuberculosis is the most favorable and the outlook here is very good, while in the acute and subacute cases the prognosis is more serious. Patients with the most extensive lesions do not give the poorest prognosis. One with a widely spread chronic fibroid lesion invariably offers a better prognosis than a patient with a limited subacute or acute lesion. In other words it is not so much the extent, as the character of the lesion, that determines the gravity of the individual case. Of course, a smaller lesion is of more favorable outlook than a more extensive involvement of the same type.

2. General condition. Temperature, pulse and weight constitute the keynote to the patient's general condition. A rapid pulse usually signi-

[1] Read before the American Academy of Ophthalmology and Oto-Laryngology at the Twenty-second Annual Meeting, Pittsburgh, Pennsylvania, October 30, 1917.

fies myocardia degeneration caused by toxemia from the tubercle, and when present for a prolonged period renders the prognosis grave. Daily or frequent elevation of temperature for a considerable length of time shows that the case is either of the acute or subacute type depending on the height of the fever. The chronic cases often have febrile exacerbations, which, however, last only a brief time. A steady subnormal temperature is a bad prognostic sign. The patient's state of nutrition is also an important guide in the prognosis.

3. Underlying disease. Gastro-enteritis has a marked effect on the prognosis. Proper digestion and assimilation are of invaluable aid to the tuberculous individual, as nothing will have a more deleterious effect on the patient's general condition than a disordered digestion. A good appetite therefore is indispensable to recovery and for this reason is an important guide in the prognosis of laryngo-pulmonary tuberculosis. Syphilis undoubtedly aggravates the prognosis by lowering the general vitality of the patient.

4. Type of laryngeal lesion. As previously pointed out by the author (1) there are three distinct types of tuberculous laryngitis, namely, acute, subacute and chronic. There is also a peracute type where the condition is hopeless and the length of the patient's life is usually from a few weeks to three months. The prognosis in the acute cases is more favorable than in the peracute, and we occasionally see such cases heal. In the subacute cases the prognosis is much better. This is the type that is most amenable to treatment, and when other factors are favorable the prognosis is good. The chronic cases are the most hopeful. Here the voice may remain affected, but the length of the patient's life is generally not influenced. We must, however, always bear in mind that any one of the lesions may suddenly change its course, and for this reason the prognosis should always be guarded.

5. Location of the lesion. The prognosis as to life is most favorable in cases where the lesion is situated in the posterior commissure or on the true cords. Such lesions usually are of the subacute or chronic type and tend to heal by fibrosis. Lesions of the epiglottis, ary-epiglottidean folds, arytenoids, and ventricular bands may be of the acute, subacute or chronic type, and the outlook here is less favorable. In other words, where the mucous membrane is closely adherent such as on the true cords and posterior commissure the disease takes a chronic course and the prognosis is therefore favorable; while where the mucous membrane is loosely adherent, as on the epiglottis, folds, arytenoids

and ventricular bands, the course is usually more acute and the prognosis less favorable.

6. The extent of the lesion. This does not necessarily influence the prognosis as to life, although cases of slight involvement are the most hopeful ones as far as the voice is concerned; nor is the prognosis less favorable in cases with ulceration. In fact local medication takes better effect when ulcers are present. Thus we may say that widespread lesions, unless of the acute type, do not necessarily indicate a poor prognosis as to life.

7. Early diagnosis. It is evident that the earlier the diagnosis is made the more easily can the lesion be cured or its progress checked. This especially applies to the subacute cases which are most benefited by treatment, and also to the chronic cases. The local resistance in the chronic cases is naturally lowered. The patient is usually unaware of the condition, and by early diagnosis and proper instruction regarding the care of the larynx, a chronic lesion will often be prevented from becoming acute. The acute cases, which as a rule take their own course are occasionally helped by an early diagnosis. The author recalls a number of acute cases that showed marked improvement after an early diagnosis was made and early treatment was instituted.

8. Early treatment. What has been said of early diagnosis may also be said of early treatment. The sooner the proper treatment is instituted the more favorable is the prognosis.

9. Complications. Nasal obstruction or disease, sinusitis, pharyngitis, or tonsilitis tend to lower the resistance of the larynx and thus influence the prognosis.

10. Financial status. The economic condition of the patient is often an important factor. Tuberculosis is a protracted and tedious disease and it takes about three to five years to accomplish an arrest of the lesion. Ample financial resources are necessary to "cure" over such a prolonged period. It is evident that the patient of independent means, who is moreover faithful to the treatment, offers a better prognosis than his fellow of insufficient financial resources, who in order to obtain a livelihood must return to business or manual labor after only a brief course of treatment.

In giving a prognosis as to life, therefore, all the above factors should be carefully studied. Although in a number of cases the lesion in the larynx runs a course independent of the lesion in the lungs, in the great majority of the patients the laryngeal lesion serves as an indicator of the

pulmonary condition, and an active process in the larynx generally indicates activity in the lungs. Not only is a thorough knowledge of all these factors necessary but the laryngeal lesion itself should be watched for a considerable length of time so that the course may be definitely determined. In cases where the lesion in the larynx is the chief predominating factor and runs an independent course, the general prognosis will of course depend chiefly on the condition in the larynx.

The prognosis as to voice is usually more definite. This will depend chiefly on the extent, location and character of the local lesion. The more extensive the process the greater the probability for the voice to remain affected. Cases with involvement of the true cords and interarytenoid space give a poorer prognosis as to voice than those in whom the lesion is situated elsewhere in the larynx. The destruction of tissue is usually greatest in the acute and subacute cases and in such cases the voice suffers most. Of course the other factors, such as early diagnosis, treatment, etc., influence the local as well as the general prognosis.

In general then it may be said that no definite prognosis as to life can be made from the condition in the larynx alone. All factors should be carefully considered and the laryngeal condition should serve only as an aid in the prognosis.

TREATMENT

The treatment of tuberculous laryngitis is first, prophylactic, second, general, and third, local.

1. Prophylactic treatment. This consists of the removal of predisposing factors capable of producing a catarrhal condition in the larynx with a consequent formation of a favorable site for the implantation of the tubercle bacillus. The predisposing factors are 1, nasal obstruction or disease; 2, pharyngitis and tonsilitis; 3, frequent "colds;" 4, abuse of the voice; 5, excessive cough; 6, local irritants, such as smoke, dust, tobacco and alcohol. All these factors have a deleterious effect on the larynx and if possible should be removed. At the Otisville Sanatorium each building has the following notice posted for the information and guidance of the patients.

IMPORTANT

Patients with pulmonary tuberculosis not infrequently develop tuberculosis of the larynx, but like tuberculosis elsewhere in the body, it can be prevented.

To prevent tuberculosis of the larynx, patients are advised:

(1) Always to breathe through the nose. Mouth breathing is a bad habit. If you cannot breathe through your nose there is a cause which needs treatment.

(2) Refrain from abuse of voice, such as shouting, singing and excessive talking.

(3) Cough as little as possible. Coughing irritates the throat.

(4) Patients subject to "colds" or sore throats can often be helped by prompt medical attention.

(5) Abstain from the use of tobacco and alcohol. These act as direct irritants to the throat.

(6) Patients having the slightest trouble in the nose or throat should consult the doctor.

2. General treatment. The general treatment is of prime importance. It is generally admitted that tuberculous laryngitis is invariably secondary to pulmonary tuberculosis, and by treating the larynx and disregarding the lungs we actually ignore the main issue. It is not only futile but also detrimental for a patient with symptoms of toxemia to go to the office or clinic for daily treatment of the laryngeal condition. The lungs should receive our first attention, and activity in the lungs requires absolute rest. The larynx in such cases may be treated with the patient in bed but never otherwise. Only cases with no activity in the chest may be allowed some exercise and may therefore be treated in the office; and in these cases, too, we must never overlook the pulmonary lesion. The sanatorium is the most ideal place, although a number of patients that are financially able could be successfully treated at home. The country, where plenty of pure air can be obtained, is undoubtedly the most desirable place of residence. A dry mountainous climate is the most agreeable in the great majority of instances. Outdoor sleeping should be urged, and persistent "curing" on a porch with a southern exposure will often accomplish surprising results. Exercise should be well regulated, and prescribed as activity in the lungs and larynx subsides. The diet should be full and nourishing, and we must always remember that good digestion is the greatest asset in tuberculous patients. The stomach should never be abused and the diet should be carefully watched and regulated. As a rule three good meals judiciously selected are sufficient. Nourishment between meals should be recommended to patients whose weight is not up to the standard, and who apparently are benefited by it. The author feels that the general treatment of the patient is far more important than the local treatment, and a patient, receiving only local attention with half-hearted or no treatment for the pulmonary condition, is not being properly treated.

3. Local treatment. No specific remedy has as yet been discovered

for tuberculosis of the larynx. The remedy, which we hope will eventually be discovered for the cure of tuberculosis of the lungs, will also cure the larynx. You are familiar with the different remedies tried, such as formalin, lactic acid, argyrol, silver nitrate, iodoform, etc. The author has tried most of them and found some cases to be benefited by one, some by another, while a good many improved or even healed spontaneously without any treatment. The method of treatment employed at the Otisville Sanatorium and found to give the best results is as follows:

First determine whether the case is acute, subacute or chronic. If chronic, and the patient suffers only from slight discomfort, such as occasional tickling, irritation, etc., he is treated with a spray of 5 per cent menthol in olive oil at frequent intervals. If no discomfort is present, he is told of his condition, warned not to abuse the larynx in any way, and no local treatment is advised. The acute and subacute cases are treated locally at regular intervals. Such patients are supplied with DeVilbiss atomizers and told to spray the larynx about four or five times a day with an alkaline solution, followed by a solution of 5 per cent menthol in olive oil. If properly used the larynx is thus kept clear of accumulated muco-pus and the patient is relieved of much discomfort.

Rest of the voice is imperative in the acute and subacute cases. Absolute silence is prescribed for the acute cases, while the whispered voice may be allowed as the case gradually becomes subacute. The patients with lesions of the chronic type may use the voice without harm. Abuse of the voice should of course always be discouraged.

For topical application the remedy found to yield the best results is a solution of iodine in glycerine. It is of the greatest benefit in the subacute and also in some of the acute cases. The author uses it in strengths varying from 1.5 to 7.5 per cent and applies it directly to the larynx on a laryngeal applicator. He begins with the 1.5 per cent solution, three times a week, gradually increasing the strength as the patient develops a tolerance to the solution. The application should be made gently during quiet breathing, and the entire larynx may be covered with it by asking the patient to attempt phonation while the applicator is in the larynx, thus squeezing the swab with the true and false cords. The swab is then immediately removed and the patient is told to breathe quietly, thus preventing a coughing spasm in the majority of instances. When the stronger solutions are used, and especially in cases with fresh

ulcerations, the patient often experiences sharp burning for a few seconds. This can easily be mitigated by previously spraying the larynx with a 2 per cent solution of cocaine. Under this treatment the author has observed infiltration diminish, granulations disintegrate and absorb, and ulcerations heal. The solutions of iodine should be in brown bottles with glass stoppers. The action of the iodine on the lesion is likely through its penetrating and antiseptic properties. The tubercle is avascular and cannot be reached by drugs through the circulation while iodine is known to have a special affinity for tuberculous tissue. The iodine may also possibly exert its beneficial effect by causing mild irritation thus producing slight reaction. The following are the formulae used:

Solution iodine no. 1

℞	Iodine cryst.		gr. vii ss
	Potass. iodid.		gr. xv
	Glycerine	qs	oz, i

Solution iodine no. 2

℞	Iodine cryst.		gr. xv
	Potass. iodid.		gr. xxx
	Glycerine	qs	oz. i

Solution iodine no. 3

℞	Iodine cryst.		gr. xxii ss
	Potass. iodid.		gr. xlv
	Glycerine	qs	oz. i

Solution iodine no. 4

℞	Iodine cryst.		gr. xxx
	Potass. iodid.		dr. i
	Glycerine	qs	oz. i

Solution iodine no. 5

℞	Iodine cryst.		gr. xxxvii ss
	Potass. iodid.		gr. lxxv
	Glycerine	qs	oz. i

Cases with superimposed catarrhal laryngitis or tracheitis are distinctly benefited by the intratracheal injection of 5 per cent menthol in olive oil at frequent intervals. It allays irritation, diminishes cough and facilitates expectoration.

For relief of pain in laryngeal tuberculosis orthoform or cocaine before meals will usually enable the patient to eat his food without distress. When the dysphagia is apparently due to infiltration and ulceration of the epiglottis, even if the lesion is not entirely confined to the epiglottis, the patient will often be relieved of this troublesome symptom by an epiglottidectomy. This operation is absolutely indicated in cases where the lesion is limited to the epiglottis, and the patient's general condition permits.

In summarizing the treatment of tuberculosis of the larynx we may say that the most important measures are:

1. The local and general prophylaxis.
2. The general treatment.
3. Vocal rest in selected cases.
4. Topical applications with a solution of iodine in increasing strengths.

(I wish to express my thanks to Miss Mary M. Nordt for her invaluable assistance, and to Mr. John Klement and Mr. Louis Schroeder, the artists, who made the drawings of the larynx.)

REPORT OF CASES

Case 1 (fig. 1). E. Mc.H. Aged nineteen, was admitted to the Otisville Sanatorium July 20, 1916. Examination of lungs showed a moderately advanced lesion with positive sputum. Larynx was found negative. Soon after admission patient began to show signs of activity as evidenced by slight febrile exacerbations in the afternoon, and a somewhat exaggerated pulse rate. These symptoms of activity, however, soon subsided. On November 18, 1916, the patient complained of slight dysphagia and on examination it was found that the epiglottis was congested and infiltrated, and was diagnosed as acute tuberculosis of the larynx. The patient was then treated with local applications of iodine solution. On December 21, 1916, it was found that the right half of the epiglottis and the right ary-epiglottidean fold were eroded. On January 9, 1917, the right arytenoid showed infiltration and ulceration, and later the entire right half of the larynx, including the posterior commissure, was involved. As activity in the larynx increased the tuberculous process in the lungs also became active. The temperature rose daily to 101°–102°F. Tachycardia became pronounced, and the patient's pulse rate was 110 to 140 while at absolute rest. During an ordinary chest examination the pulse would rise to 180 per minute. During the first five months the patient showed a gain in weight of 16 pounds, while during the last four months she lost the entire amount gained. The patient left the sanatorium on April 8, 1917, unimproved, and died about three months later.

Discussion. The outstanding features of this case are:

1. The patient lived for about eight months after the development of the laryngeal lesion.
2. The patient was doing well up to the time of the development of the lesion in the larynx.
3. The pulmonary lesion became active soon after the laryngeal involvement was discovered.
4. The lesion began at the epiglottis and spread to the right fold and arytenoid and posterior commissure. Acute lesions beginning at the epiglottis are usually fatal.
5. In spite of the ulcerations there was never enough dysphagia to interfere with the taking of food.
6. The pronounced tachycardia, which is generally a grave prognostic sign.
7. Treatment did not have any modifying influence on the course of the disease.

Case 2 (fig. 2). F. G. Aged twenty-eight, was admitted to the Otisville Sanatorium March 15, 1917, with advanced pulmonary tuberculosis. The entire right vocal cord was eroded, with infiltration and erosion of the right ventricular band. Also partial erosion ("mouse-eaten" appearance) of the left cord and hyperplasia at the posterior commissure with chronic infiltration of both arytenoids. Wassermann negative. There was a history of hoarseness for the past fifteen months with occasional aphonia. The onset of the hoarseness was gradual. The diagnosis was chronic tuberculosis of the larynx. Soon after admission patient developed complete aphonia and dysphonia which persisted during his entire stay at the sanatorium. The larynx then showed acute edema of both arytenoids with complete erosion of both cords. The larynx did not respond to treatment and the patient left the sanatorium on June 28, 1917, and died August 26, 1917.

Discussion. This case illustrates that occasionally a chronic lesion will suddenly change its course and become acute. Such a course is uncommon but does happen, and for this reason the prognosis should always be guarded.

Case 3 (fig. 3). P. V. Aged thirty-eight, admitted to the Otisville Sanatorium February 23, 1916. On examination the pulmonary lesion was found moderately advanced with slight activity. Larynx showed edema and ulceration of the right ventricular band and the right arytenoid, also slight edema of the left arytenoid with infiltration of the vocal process. The Wassermann test was negative. Discomfort in the larynx was the principal subjective symptom. The diagnosis was acute tuberculosis of the larynx. In about one month after admission patient began to show improvement in the larynx.

The examination on May 2nd showed marked fibrosis of right ventricular band, and right arytenoid. Process becoming subacute. The local treatment that the patient received consisted of sprays and several applications of a solution of iodine. The patient was discharged from the sanatorium January 14, 1917.

On September 25, 1917, in answer to an inquiry the patient wrote that he has gained ten pounds in weight since he left the sanatorium, and that his throat does not give him any trouble at all.

Discussion. From the patient's statement it might be surmised that the process in the larynx has now become chronic and quiescent, thus illustrating that occasionally an acute case changes its course and heals.

Case 4 (figs. 4 and 5). I. T. Aged twenty, admitted to the Otisville Sanatorium on December 28, 1916. Chest examination revealed a moderately advanced lesion of the lungs. On the 3rd day at the sanatorium, the patient developed a slight afternoon fever which afterwards became persistent, rising to 101°–102°F. on every afternoon, while the pulse ranged between 110 and 130 during his entire stay at the sanatorium. Examination of the larynx, on admission, showed a uniform infiltration of the epiglottis with slight thickening at the posterior commissure and arytenoids (fig. 4). On January 5th the patient complained of slight dysphagia, and the examination showed the beginning of tuberculous infiltration of the oro-pharynx which kept getting more extensive, while the symptoms were gradually becoming more troublesome. On February 1st, the patient complained of severe dysphagia and regurgitation of liquid food through the nostrils. He then showed extensive infiltration and ulceration of the oro-pharynx and fauces. The uvula was edematous. The larynx showed edema of the epiglottis and both arytenoids, and the Wassermann test was negative.

On February 14, 1917, the lesion was widespread. The uvula was much swollen and covered with macroscopic tubercles. The lingual tonsils were also ulcerated. The larynx showed acute edema with macroscopic tubercle of all parts (fig. 5). All during the stay at the sanatorium the patient received local applications of a solution of iodine to the affected parts, with no apparent benefit. On February 15 the patient was transferred to a city hospital where he died a few days later.

Discussion. The chief points of interest in this case are:

1. The patient died about eight weeks after the diagnosis of the laryngeal lesion was made.

2. As the pulmonary lesion became acute the laryngeal involvement also became acute.

3. The lesion began at the epiglottis, and this should always be regarded as a bad sign.

4. The acute involvement of the posterior wall of the oro-pharynx, the fauces, the tonsils, the uvula and the lingual tonsils.

5. The overwhelming toxemia as evidenced by the range of pulse and temperature.

This is a typical case of the peracute type and the prognosis is extremely grave.

Case 5 (fig. 6). P. S. Aged twenty-two, admitted to Otisville Sanatorium October 28, 1915, in an advanced stage of phthisis. Examination of the larynx revealed infiltration with superficial ulceration of both ventricular bands, erosions of both cords and swelling of both arytenoids. About five months after admission the involvement in the larynx became acute, the epiglottis much infiltrated and eroded and the dysphagia pronounced. Amputation of the upper two-thirds of the epiglottis was followed by marked local and general improvement. The lesion became subacute (fig. 6) and the patient was discharged from the sanatorium on March 22, 1917, with the laryngeal lesion quiescent, and the pulmonary condition improved. On September 25, 1917, in answer to an inquiry the patient wrote that he had made wonderful improvement in his general and throat conditions, that his voice was surprisingly good, and that he felt much better than on the day of the discharge from the sanatorium.

Discussion. The interesting feature of this case is the local and general improvement which followed the amputation of the epiglottis.

Case 6 (fig. 7). J. A. Aged twenty-four, admitted to the Otisville Sanatorium June 25, 1914. Examination revealed a moderately advanced lesion with bacilli in the sputum. Larynx revealed infiltration and erosion of both cords, especially the left which showed a longitudinal ulcer. Infiltration of both ventricular bands partially covering the true cords. Patient suffered from marked hoarseness, and the lesion, having passed an acute stage, was undergoing fibrosis. The diagnosis then was subacute tuberculosis of the larynx. On September 9, 1915, the examination showed marked infiltration with ulceration of both cords while other findings were the same. The patient was discharged from the sanatorium October 7, 1915, with both larynx and lungs unimproved.

In answer to an inquiry his family recently wrote that the patient died November 19, 1916.

Discussion. The patient lived for about two and one-half years after initial diagnosis of laryngeal tuberculosis. The lesion apparently began as acute, a little later showed some tendency to fibrosis, and finally again became acute.

Case 7 (figs. 8 and 9). P. F. Aged twenty-one, was admitted to Otisville Sanatorium September 21, 1916, complaining of hoarseness. A broad base, papillomatous growth was found in the posterior commissure of the larynx. It represented the characteristic ragged appearance with adhering streaks of muco-pus, and there was infiltration and slight ulceration of the free edges of both true vocal cords (fig. 8). This patient was in an advanced stage of pulmonary tuberculosis. The diagnosis was subacute tuberculosis of the larynx.

Figure 9 shows same patient as in figure 8, after seven months of local treatment with the solution of iodine in increasing strengths. The examination showed that the papillomatous infiltration at the posterior commissure had entirely disappeared leaving some slight scar tissue. The cords are still somewhat thickened and slightly rough at the free edges. Hoarseness is very slight. There is no discomfort.

Discussion. The interesting features in this case are:

1. The beneficial effects of the solution of iodine on the papillomatous growth.
2. The lesion which was previously subacute is now chronic.

Case 8 (figs. 10 and 11). J. C. Aged thirty-two, first admitted to the Otisville Sanatorium August 21, 1913. The examination of the chest revealed an early pulmonary lesion with a positive sputum. The larynx showed papillomatous infiltration at the posterior commissure. Slight thickening of left arytenoid and cartilage of Wrisberg. Both cords slightly infiltrated and fibrosed (fig. 10). Constant dryness and irritation in larynx. Marked hoarseness for past three years, the latter mostly due to the incomplete approximation of the cords. The diagnosis was subacute tuberculosis of the larynx. About two years after admission the patient was found to give a four plus Wassermann reaction. There was no history of an initial syphilitic lesion. He was then put on mixed treatment and given four intravenous injections of salvarsan, at the end of which time the reaction was still positive and the condition in the larynx remained about the same. On April 1, 1916, the patient left the sanatorium and received intensive antiluetic treatment in a New York City clinic. This treatment extended over a period of six months and consisted of 14 intravenous injections of salvarsan in addition to the mixed treatment. The patient was readmitted to the sanatorium on June 21, 1917. The examination then revealed a far advanced pulmonary lesion with a moderate amount of activity. Sputum positive. The larynx showed infiltration of left cord and papillomatous infiltration and ulceration at posterior commissure (fig. 11). Marked hoarseness, slight dysphagia. Wassermann reaction was negative. Three months later another Wassermann test was made which, however, proved positive.

Discussion on diagnosis and prognosis. The laryngeal lesion has all the ear marks of tuberculosis and the original diagnosis is likely correct. The positive Wassermann may be indicative of a luetic infection in spite of a negative history. The prognosis in this patient is uncertain on account of the different elements entering into the case.

Case 9 (fig. 12). J. C. Aged thirty-eight, admitted to the Otisville Sanatorium in 1913, and found to have a moderately advanced pulmonary lesion with positive sputum. Wassermann negative. Larynx showed a tuberculoma of the interarytenoid space with healed erosion. Thickening and infiltration of both cords, especially the left. Left cord also showed healed ulceration on its upper surface. Infiltration of both ventricular bands, especially the right, which almost entirely covered the right cord (fig. 12). The lesion showed complete fibrosis, and outside of marked hoarseness, the patient had no discomfort. The diagnosis was chronic tuberculosis of the larynx. Examination of the larynx three and one-half years later showed the findings to be identically the same. In the meantime the patient has been doing very well, and shows no signs or symptoms of decline. The probable duration of the lesion according to the patient's history is about ten years. The patient does not receive any local treatment.

Discussion. This case illustrates:

1. That an extensive lesion does not always indicate a poor prognosis. This lesion was widespread.
2. That the laryngeal lesion has already existed for about ten years, without harming the patient.
3. That the prognosis as to life will likely remain uninfluenced by the laryngeal lesion, while the voice will remain affected.
4. That no local treatment is necessary in such cases.

Case 10 (figs. 13 and 14). E. C. Aged twenty-four, admitted to the Otisville Sanatorium January 11, 1917. Sputum negative. Wassermann negative. Physical examination of chest showed no signs of pulmonary involvement. Lungs also negative on X-ray examination. Larynx showed a warty growth of all parts (fig. 13). Hoarseness, dysphonia and discomfort in the larynx were the troublesome symptoms. The diagnosis was lupus of the larynx.

Figure 14 shows the same patient as in fig. 13 about seven months later. The cords and arytenoids were remarkably clear. The lupoid growth was limited to the epiglottis. The only treatment the patient received in addition to the general treatment consisted of local applications of argyrol, solution iodine and intratracheal injections of menthol in olive oil.

Discussion. It is remarkable to note how such an extensive lupoid

lesion cleared up in a comparatively short period and without any surgical treatment.

Case 11 (figs. 15 and 16). J. C. Aged twenty-three, admitted to the Otisville Sanatorium April 22, 1915, and on examination the pulmonary lesion was found moderately advanced. Sputum positive. Larynx showed marked infiltration and ulceration of both cords, presenting a nibbled out appearance. Interarytenoid hyperplasia with wrinkling of mucous membrane. Slight edema of right ventricular band (fig. 15). History of dysphagia and marked hoarseness for past one and one-half years. The diagnosis was subacute tuberculosis of the larynx. Several months later the patient showed distinct fibrotic changes in the larynx, and was discharged from the sanatorium on August 3, 1916, with larynx markedly improved.

Figure 16 shows the same patient as in figure 15, who was readmitted to the Otisville Sanatorium on August 13, 1917, and the examination revealed infiltration of right arytenoid and fold, right half of epiglottis, and posterior portion of right cord. The infiltration was of the chronic granular type, and looked almost like a lupoid growth. The left cord and anterior portion of right cord all cleared up (fig. 16). There was still a moderate amount of hoarseness. Wassermann reaction negative.

Discussion. The change of the subacute into the chronic course renders the prognosis in this patient very favorable.

Case 12 (fig. 17). M. B. Aged twenty, admitted to the Otisville Sanatorium May 17, 1917. Sputum positive. Wassermann negative. The examination of the chest revealed a moderately advanced lesion with slight activity. The laryngeal examination showed pear-shaped infiltration of left arytenoid and ary-epiglottidean fold. Infiltration and erosion of left ventricular band. Infiltration of left half of epiglottis which is drawn to the arytenoid (fig. 17). Patient suffered from slight hoarseness and occasional discomfort in larynx. No other symptoms. Lesion running a subacute course. In addition to the general treatment this patient has received local applications of iodine solution for past five months with marked improvement. Swelling much diminished and symptoms disappeared.

Discussion. This patient has been much benefited by local treatment with iodine solution, the lesion showing a tendency to fibrosis.

Case 13 (fig. 18). D. A. Aged thirty, was admitted to the Otisville Sanatorium July 16, 1917. Sputum positive. Wassermann negative. Pulmonary lesion moderately advanced with slight activity. Larynx showed infiltration of posterior commissure and thickening of both arytenoids. Infiltration with erosion of left ventricular band, covering the entire left cord (fig. 18). Patient has had marked hoarseness for past nine months.

Discussion on prognosis. With the laryngeal lesion of the chronic type and well fibrosed, and with the pulmonary lesion healing, the prognosis is very good as to life, while the voice will likely remain unimproved.

REFERENCE

(1) DWORETZKY: Clinical pathology of tuberculous laryngitis. Annals of Otology, Rhinology and Laryngology, December 1916, 804.

EXPLANATION OF FIGURES

FIG. 1. CASE 1

E. McH. Aged nineteen. Pulmonary lesion moderately advanced. Infiltration of epiglottis with ulceration of the right half; infiltration and erosion of right ary-epiglottidean fold and arytenoid, and hyperplasia at posterior commissure.

Diagnosis. Acute tuberculosis of the larynx. Treatment had no beneficial influence.

FIG. 2. CASE 2

F. G. Aged twenty-eight. Pulmonary lesion far advanced. Erosions of entire right vocal cord with infiltration and erosion of right ventricular band. "Mouse-eaten" appearance of left cord with hyperplasia at posterior commissure and thickening of both arytenoids.

Diagnosis. Chronic tuberculosis of the larynx. The lesion later became acute, and patient died in about three months.

FIG. 3. CASE 3

P. V. Aged thirty-eight. Pulmonary lesion moderately advanced. Edema and ulceration of right ventricular band and right arytenoid. Wassermann negative.

Diagnosis. Acute tuberculosis of the larynx. Under treatment the course became subacute and patient showed marked improvement. The prognosis is extremely favorable as to length of life.

FIG. 4. CASE 4

I. T. Aged twenty. Pulmonary lesion moderately advanced. Acute edema of epiglottis; slight interarytenoid thickening.

FIG. 5. CASE 4

Acute infiltration with ulceration of all parts of the larynx. The course became peracute and the patient died in about eight weeks after the initial diagnosis of the laryngeal lesion.

FIG. 6. CASE 5

P. S. Aged twenty-two. Pulmonary lesion far advanced. Lesion in the larynx was acute with infiltration and erosion of epiglottis. After an epiglottidectomy the lesion became subacute with marked improvement in both the local and general conditions.

FIG. 7. CASE 6

J. A. Aged twenty-four. Pulmonary lesion moderately advanced. Infiltration and erosion of both cords, especially left, with a longitudinal ulcer.

Diagnosis. Subacute tuberculosis of the larynx. The lesion later became acute, and the patient died in about two and one-half years after initial diagnosis was made.

FIG. 8. CASE 7

P. F. Aged twenty-one. Pulmonary lesion far advanced. Broad base papillomatous growth at posterior commissure.

Diagnosis. Subacute tuberculosis of the larynx.

FIG. 9. CASE 7

Same patient after seven months of treatment with topical applications of the solution of iodine. Papilloma has disappeared, and the lesion has become chronic.

FIG. 10. CASE 8

J. C. Aged thirty-two. Incipient pulmonary lesion. Papillomatous infiltration at posterior commissure. Wassermann four plus.

Diagnosis. Subacute tuberculosis of the larynx.

FIG. 11. CASE 8

Same patient as in figure 10, about three years later. Pulmonary lesion far advanced. Infiltration of left cord; papillomatous infiltration and ulceration at the posterior commissure. Patient received intensive antiluetic treatment.

FIG. 12. CASE 9

J. C. Aged thirty-eight. Pulmonary lesion moderately advanced. Wassermann negative. Large tuberculoma at posterior commissure with infiltration and fibrosis of nearly all parts of the larynx.

Diagnosis. Chronic tuberculosis of the larynx. Prognosis as to patient's life not influenced by the laryngeal lesion.

FIG. 13. CASE 10

E. C. Aged twenty-four. Sputum negative. Wassermann negative. Lungs negative on physical and X-ray examinations. Warty growth of all parts of the larynx.

Diagnosis. Lupus of the larynx.

FIG. 14. CASE 10

Same patient as in figure 13 seven months later.

FIG. 15. CASE 11

J. C. Aged twenty-three. Pulmonary lesion moderately advanced. Marked infiltration and ulceration of both cords.

Diagnosis. Subacute tuberculosis of the larynx with tendency to fibrosis. Was discharged from the sanatorium with larynx much improved.

FIG. 16. CASE 11

Same patient as in figure 15, one year later. Infiltration of right half of larynx, resembling a lupoid growth. Prognosis as to life very favorable.

FIG. 17. CASE 12

M. B. Aged 20. Pulmonary lesion moderately advanced. Pear-shaped infiltration of left arytenoid and ary-epiglottidean fold. Infiltration with erosions of left ventricular band. Larynx showed marked improvement under treatment with solution of iodine in increasing strengths.

FIG. 18. CASE 13

D. A. Aged thirty. Pulmonary lesion moderately advanced. Infiltration with ulceration of left band, and interarytenoid hyperplasia. Lesion is of the chronic type and well fibrosed. The prognosis as to life is very good, while the voice will likely remain unimproved.

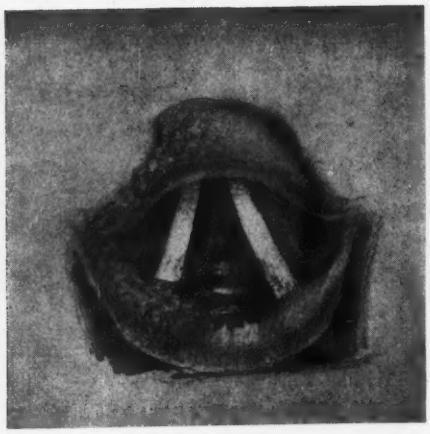

FIG. 1. CASE 1

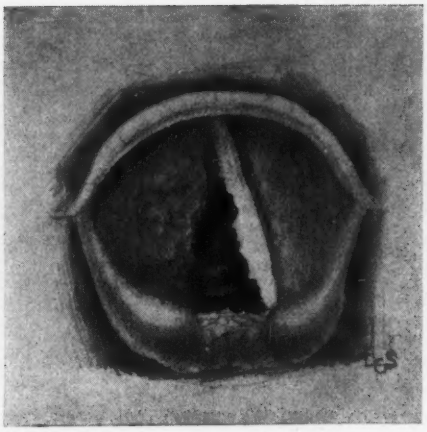

FIG. 2. CASE 2

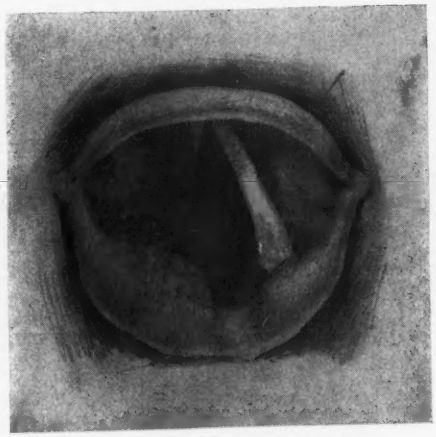

FIG. 3. CASE 3

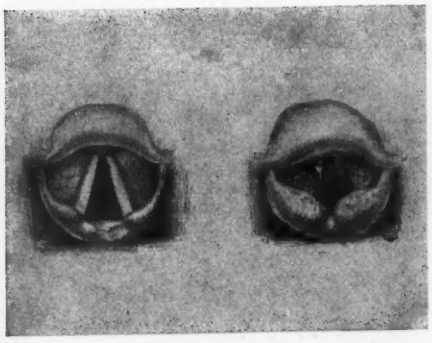

FIG. 4. CASE 4

FIG. 5. CASE 4

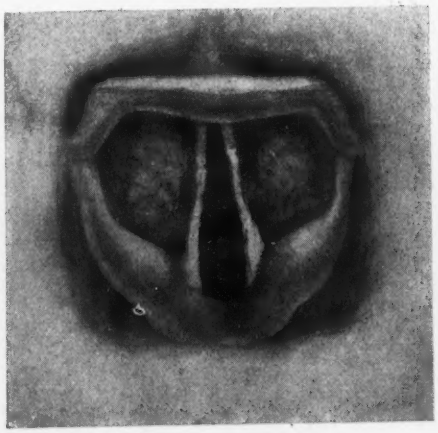

FIG. 6. CASE 5

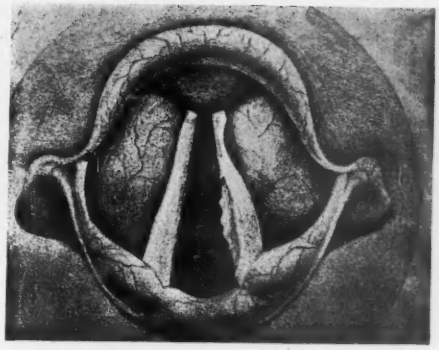

FIG. 7. CASE 6

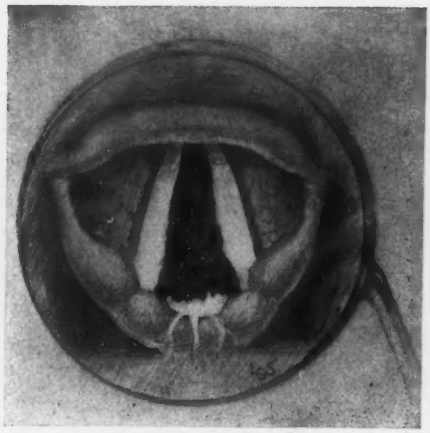

FIG. 8. CASE 7

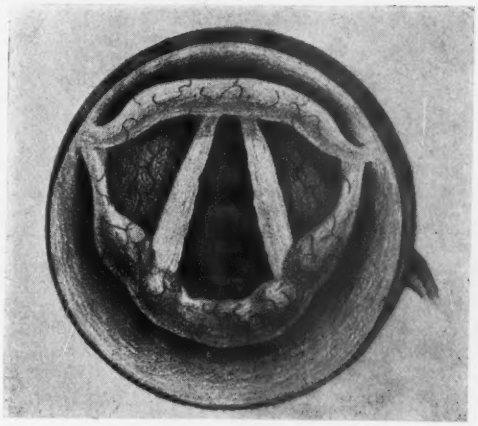

FIG. 9. CASE 7

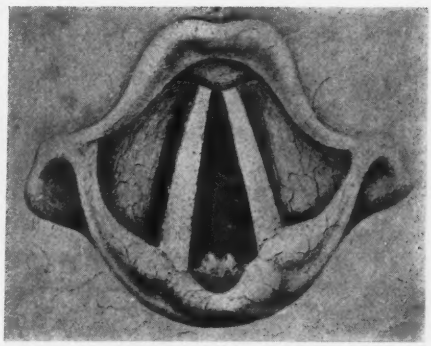

FIG. 10. CASE 8

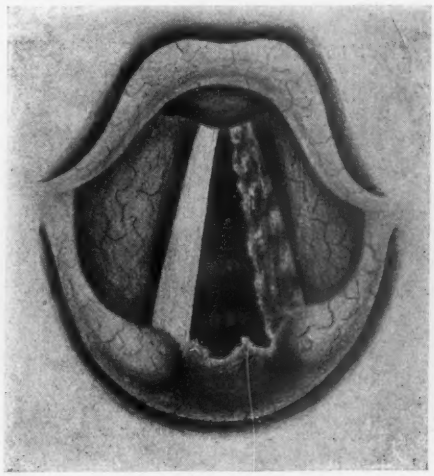

FIG. 11. CASE 8

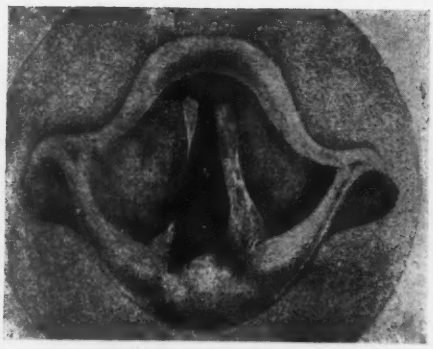

FIG. 12. CASE 9

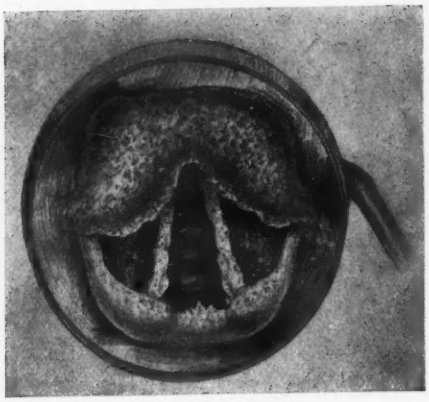

FIG. 13. CASE 10

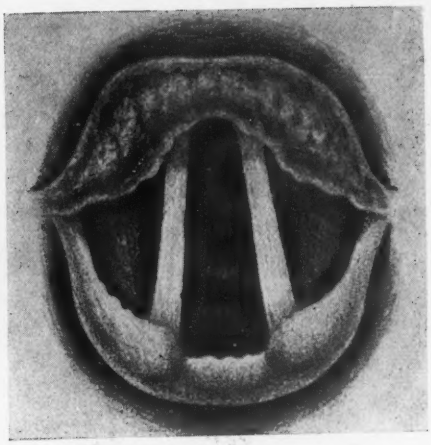

FIG. 14. CASE 10

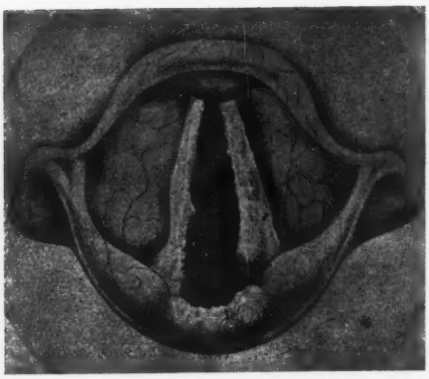

FIG. 15. CASE 11

FIG. 16. CASE 11

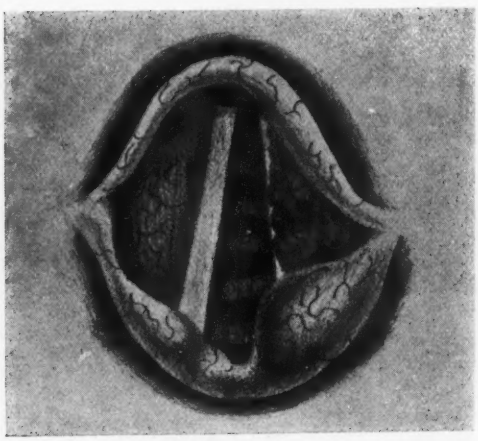

FIG. 17. CASE 12

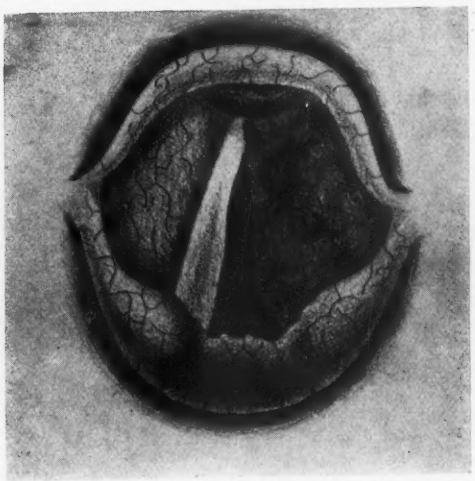

FIG. 18. CASE 13

TOBACCO AND THROAT COMPLICATIONS IN PULMONARY TUBERCULOSIS

WILLIAM S. DUBOFF

From the Sanatorium of the Jewish Consumptives' Relief Society, Edgewater, Colorado

The following statistical study was undertaken with the object of determining the influence of tobacco as an etiological factor in laryngeal involvement during the course of pulmonary tuberculosis. A general impression prevails that tobacco, being an irritant, produces a state of chronic congestion of the upper respiratory passages and a consequent lowered local resistance to the tubercle bacillus. This appears to be theoretically sound. Smoking also undoubtedly produces a pharyngitis, with increased cough and expectoration. However, it has not been conclusively demonstrated that tuberculous laryngitis is more frequent in smokers.

One thousand histories of tuberculous cases were studied at the Sanatorium of the Jewish Consumptives' Relief Society, although patients' histories are not always the most reliable data by which to go. The tuberculous individual seems to admit smoking with considerable reluctance and, unless questioned persistently, the usual statement will be that he does not use tobacco; when as a matter of fact, the abstinence may only be of a few months' duration. In this respect, a number of the older histories from which these figures were taken probably have been incomplete. As a matter of fact, in 109 cases questioned by the writer, a positive history was obtained in 65 (59.6 per cent) while the percentage of smokers in the whole series was only 46. What error there may be in this regard would merely serve to accentuate the conclusions drawn from this study.

Smokers were classed as *excessive*, *moderate*, and *light*. Twenty cigarettes or half-dozen cigars daily was considered excessive. Ten cigarettes or a cigar after each meal was moderate. And the occasional smoker was put in the *light* class. A patient was classsed as a smoker even if the abstinence was prolonged, provided that the pulmonary condition antedated the cessation of the habit. But the onset of tuberculosis cannot always be accurately determined, so that doubtful cases may give rise to a certain amount of unavoidable error.

In order to render the evidence more conclusive, the chronic laryngitis cases were included with those actually having throat tuberculosis. A temporary hoarseness or aphonia was not considered.

Women, at least among our class of patients, do not smoke. For that reason it was considered advisable to include these cases and to compare results. Figures showing the relative frequency of tuberculous laryngitis in the sexes vary from 1.29–1 (Agnes Memorial Sanatorium) to 3.7–1 (Kruse), males predominating (1). Comparisons made directly from throat cases, without considering the proportion of men and women involved, can give no accurate clue to the predisposition of the sexes. The figures in this series were obtained by comparing the number of throat complications in the course of pulmonary tuberculosis in men and women respectively.

The histories examined date back five years. Of the 1000 cases, there were 793 males and 207 females (3.8–1). This is a constant proportion at all times in this institution. There were 299 throat cases (29.9 per cent). As has been mentioned, the only criteria in determining throat cases were prolonged hoarseness or aphonia. That the number of chronic laryngitis cases included was a negligible factor is shown by comparison with figures obtained by other observers, who have included only true tuberculous laryngitis cases, their estimates being 25–30 per cent. Incidentally, our figures indicate that the Jewish race is not less susceptible to throat tuberculosis than other races.

Among the 793 men, there were 240 throat cases (30 per cent) and 368 (46 per cent) light, moderate or excessive smokers. In just what proportion these were, is not possible to say, as some of the histories were incomplete, not stating the exact amounts and kind of tobacco used. However, the majority of these were definitely moderate or excessive in their use of tobacco, and were for the most part advanced pulmonary cases. Of these 368 smokers, 133 (36.1 per cent) developed "throats" (table 3), while among 425 non-smokers there were 107 or 25.2 per cent, a difference of nearly 11 per cent in favor of the smokers. But if we assume that 46 per cent of the total smokers among the men is too low and that 59.6 per cent is nearer correct, as the writer believes, then the percentage of "throats" in smokers is 28.1 per cent (table 4) and in non-smokers, 33.4 per cent. The uncertainty of patients' histories and the difficulty in establishing the onset of pulmonary tuberculosis make a difference of 5 per cent valueless.

Among 207 women, 59 had throat involvement (29 per cent), a pro-

portion practically identical with that of the men. Whatever error may have crept in among the male records owing to defective histories, cannot appear in women patients, whose average is virtually identical with that given by the majority of observers for all cases of tuberculosis. In order to establish a given factor as concerned in the etiology of a given pathological condition, one must demonstrate that the factor is associated with the majority of the cases. Since women are non-smokers and throat tuberculosis is as common among women as among men, it is obvious that in a number of throat cases equally divided between men and women, the majority will give no tobacco history at all.

TABLE 1

Table of total cases—1000

	NUMBER	TOTAL CASES	
Male			
		per cent	*per cent males*
Smokers	368	36.8	46.4
Non-smokers	425	42.5	53.6
Total	793	79.3	100.0
Female			
			females
Smokers	—	—	—
Non-smokers	207	20.7	100.0
Total	207	20.7	100.0

TABLE 2

Table of throat cases—299

	NUMBER	TOTAL CASES	
Male			
		per cent	*per cent males*
Among smokers	133	13.3	16.8
Among non-smokers	107	10.7	13.5
Total	240	24.0	30.3
Female			
			females
Among smokers	—	—	—
Among non-smokers	59	5.9	28.5
Total	59	5.9	28.5

TABLE 3

Tobacco-throat table

Male

Number of smokers	Number of throats	Per cent
368	133	36.1
Number of non-smokers	**Number of throats**	**Per cent**
425	107	25.2
Female		
Number of smokers	Number of throats	Per cent
—	—	—
Number of non-smokers	Number of throats	Per cent
207	59	28.5

TABLE 4

Tobacco-throat table—males (corrected to 59.6 per cent)

Number of smokers	Number of throats	Per cent
473	133	28.1
Number of non-smokers	Number of throats	Per cent
320	107	33.4

CONCLUSIONS

1. Throat complications are probably no more frequent in tobacco users than in those who use no tobacco.

2. Laryngitis, whether of specific character or not is equally common among women as among men in the course of pulmonary tuberculosis.

3. In an equal number of men and women with pulmonary tuberculosis, the majority of throat involvements will be associated with a negative tobacco history.

4. Tobacco obviously does not predispose to laryngeal complications.

(The author wishes to take this opportunity of thanking Mr. N. Baum, and Mr. M. Goldfogel, of the Sanatorium for assistance in reviewing charts and tabulating figures.)

REFERENCE

(1) LOCKARD: Tuberculosis of the nose and throat.

THE EFFECT OF THE INHALATION OF CIGARETTE SMOKE ON THE LUNGS

A CLINICAL STUDY[1]

GERALD B. WEBB

Major, Medical Reserve Corps, United States Army

The opportunity of examining different commands of the United States Army for tuberculosis was used to ascertain, if possible, clinical changes in the chest in those who inhalēd the smoke of cigarettes.

It has been commonly observed that cigarette smokers have an irritative cough and there is an impression in the profession that this is due to throat irritation. Medical men who have given close attention to diseases of the chest have recognized a cigarette bronchitis.

In auscultation bronchial conditions are usually recognized by the presence of ronchi,[2] at times by the presence of coarse moist râles. Bronchial ronchi are heard best coincident with the cough of the subject undergoing examination, and not with inspiration or expiration. Such ronchi can best be heard over the lung roots, along the sternal margins and in the interscapular region, and also in the axillae. These ronchi were listened for in over 3000 soldiers which are tabulated below.[3] Their presence or absence was noted as indicated. A record was also kept as to the soldiers' preference in regard to tobacco and this preference is listed in the table.

There can be no doubt that the inhalation of cigarettes produces ronchi. The table shows clearly that the majority of cigarette smokers reveal the presence of bronchial ronchi, whereas the majority of non-smokers, of pipe smokers, and of cigar smokers do not show such evidence. Slight catarrhal cold epidemics occurred during these investigations, but soldiers acknowledging such are not included in these figures. It is possible however that such unrecognized conditions may

[1] Published simultaneously by authority of the Surgeon General in THE AMERICAN REVIEW OF TUBERCULOSIS and *The Military Surgeon.*

[2] By ronchi are meant sibilant râles.

[3] Correct instructions were given to each man to breathe in moderately, then to breathe out, and then to give a short, sharp cough.

have placed the percentage of non-smokers with ronchi a little too high. The figures suggest that Bull Durham causes more irritation than other tobaccos. In addition to ronchi, medium and coarse râles were observed

Table showing ronchi production in smokers and non-smokers

		FINE RONCHI	MEDIUM RONCHI	COARSE RONCHI	NEGATIVE	WITHOUT RONCHI
						per cent
Non-smokers		172	5	0	479	73
Smokers						
Bull Durham	Light	43	36	2	17	17
	Medium	211	91	4	52	14
	Heavy	112	67	6	18	9
Prince Albert	Light	26	3	0	17	36
	Medium	132	22	1	64	29
	Heavy	20	18	2	18	30
Tailor Made	Light	70	2	0	63	46
	Medium	367	87	0	273	38
	Heavy	358	55	2	93	18
Pipe		67	5	0	52	41
Cigars	Medium	63	0	0	70	53
	Heavy	11	0	0	12	52

Total number non-smokers	656
Total number smokers	2632
Total number reported on	3288
Percentage of non-smokers	19.9

Discharged for tuberculosis

Pipe	13
Cigars	7
Tailor Made	116
Bull Durham	30
Prince Albert	16
Total smokers	182
Non-smokers	51
Total	233[4]
Percentage of non-smokers	21.9

in many heavy cigarette smokers. These râles would usually disappear after several coughs. Occasionally a very quiet vesicular murmur was observed.

[4] The 233 men discharged were from a command of about 25,000 men. Records were kept of the smoking habits of each man.

Among tuberculosis workers there has always been an effort to absolutely forbid cigarette smoking by their patients. We all recall the dismay of Dr. Trudeau over his celebrated patient, Stevenson, an inveterate cigarette smoker. We recall too that according to Stevenson's biography he overcame his tuberculous condition and finally died of apoplexy.

It has been noted that coal miners who get their lungs choked with coal dust, and who may even suffer to a certain extent from pulmonary fibrosis, are even less liable to die of pulmonary tuberculosis than most men. Cobbett (1) also notes that experience had shown that in the old underground railroad system of London before the trains were electrified certain stations notorious for their mephitic vapors were selected as of value to the consumptive employees. Italians have observed that sulphur has retarded the development of tuberculosis.

Regarding the soldiers who were found tuberculous and deemed unfit for service by the writer and his co-workers on War Department Tuberculosis Boards the table indicates that a somewhat larger percentage of non-smokers were discharged than smokers.

If we add to the non-smokers those who do not inhale and do not show evidence of the production of ronchi, namely the pipe and cigar smokers, we then record the observation that 30 per cent of those discharged on account of pulmonary tuberculosis did not inhale cigarettes.

These studies would at least suggest that the inhalation of the smoke of cigarettes does not aid in the outbreak of pulmonary tuberculosis.

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TYPHOID BACTERIEMIA DURING THE COURSE OF MILIARY TUBERCULOSIS.

ARTHUR BLOOMFIELD

From the Medical Clinic of the Johns Hopkins Hospital, Baltimore, Maryland

The presence of typhoid bacilli in the blood stream during the course of an acute febrile disease is generally considered to be satisfactory evidence that the condition is typhoid fever. Inasmuch as this disease and miliary tuberculosis frequently present points of striking clinical similarity, it seems of interest to put on record instances of typhoid bacteriemia in which at autopsy there are found not the expected lesions of typhoid fever but those of generalized tuberculosis.

This combination of findings is of course very rare but Busse (1) reports two cases which are quite similar to those here described. The first was that of a woman 48 years old who presented clinically a case of typhoid fever. The Widal reaction was negative, but the blood culture on two occasions yielded typhoid bacilli. At autopsy there was miliary tuberculosis, apparently without the lesions of typhoid fever. No post mortem cultures were made. In the second case, the Widal reaction was also negative, but one blood culture and a culture made at autopsy from the gall bladder showed typhoid bacilli. The lesions were those of miliary tuberculosis and not of typhoid fever.

During the last few years the following similar cases have occurred in the medical service of the Johns Hopkins Hospital.

CASE REPORTS

Case 1. Generalized tuberculosis; tuberculous meningitis; recovery of B. typhosus from blood in pure culture on thirteenth and nineteenth days of disease; negative Widal reaction; no evidence clinically of typhoid fever.

P. L. H. A colored boy, aged eight years, was admitted to the hospital on October 3, and died on October 15. He was brought to the hospital with the statement that he had complained of "misery in his stomach" and that his head felt "heavy."

There was no history of previous typhoid fever. Except for whooping-cough, three years before, he had been a healthy child. Twelve days before

admission he complained of abdominal pain, and vomited, and during the next week continued to have headache, moderate abdominal pain and constipation, especially after meals. Four days before entry he became drowsy and dull and at this time was put to bed. The dulness rapidly increased. There was muttering delirium, retraction of the head, rolling of the eyes, and grinding of the teeth.

On admission his temperature was 99.6°F. and his pulse 80. He was a fairly well nourished looking boy, drowsy, and unresponsive to questioning, although not in deep coma. The head was retracted, the neck rigid, and the spine perfectly stiff; the extremities were somewhat spastic, and Kernig's sign was present on the left side. The pupillary reactions were normal, but there was slight incoördination of the eyes. The breathing was irregular, not definitely periodic. The cervical and epitrochlear glands were slightly enlarged. The lungs were clear except for a few fine râles in the right axilla, and the heart showed nothing abnormal. The abdomen was tense; the spleen not palpable.

Blood pressure was 120, urine clear, and stools normal. The red cells were 5,100,000, with 68 per cent of haemoglobin, and the leucocyte count was 8200. On lumbar puncture 35 cc. of clear fluid was withdrawn. The cell count was 387, of which 77 per cent were mononuclears. The globulin test was positive.

The course during the twelve days in the hospital was one of progressive failure. There was low irregular fever, hardly ever above 101°F. except for a terminal rise; and rapid, weak, and variable pulse. Repeated lumbar punctures showed essentially the same findings as above noted although tubercle bacilli were at no time demonstrated in the fluid. There was never any diarrhoea, and the spleen was not felt. The leucocytes at one time rose to 11,200 with 85 per cent polymorphonuclears. Death occurred suddenly in collapse.

On October 4, the thirteenth day of the illness, the routine blood culture, made in all febrile cases, yielded B. typhosus in pure clulture. Blood culture was repeated on October 10, and B. typhosus again recovered. These organisms showed typical cultural characteristics and were agglutinated in high dilutions by a stock typhoid immune serum. On October 9, the Widal reaction was negative. There was no clumping, and motility was active in a dilution of 1–50 after one hour. There was nothing in the clinical course of the case at any time to suggest typhoid fever.

Autopsy (no. 3788). Made about ten hours after death (Dr. Schmeisser). Anatomical diagnosis: Tuberculosis of bronchial lymph glands; bronchopneumonia (tbc.?) Miliary tubercles of left lung with early cavity formation, miliary tubercles of visceral pleura (bilateral), tonsils, spleen, and capsule of

liver; chronic fibrous pleurisy (bilateral); acute tuberculous meningitis; decubitus ulcers.

Extracts from pathological notes: Spleen weighs 35 grams, measures 8 by 5 by 1.5 cm. It is smooth. Beneath the capsule are several small yellowish-white opaque nodules 2 mm. in diameter. On section the capsule does not appear to be thickened. The trabeculae stand out as fine bluish lines. The Malpighian corpuscles are rather large and prominent. The pulp is normal in amount.

Liver weighs about 650 grams, measures 20 by 15 by 4.5 cm. The surface is very smooth and glistening. One or two small bluish-white translucent nodules are present. On section, color of liver is found to be a dirty brown. The lobules are prominent. Gall bladder is of medium size and contains a small amount of brownish fluid. Its mucosa is velvety.

Intestines: the Peyer's patches of the small intestine are large but show no swelling, and are apparently uninvolved. The solitary follicles of the large intestine are prominent but not abnormally so.

Microscopic sections of spleen, liver and intestines show no histological changes. Bronchial lymph glands show typical miliary and conglomerate tubercles.

No cultures were made at autopsy.

Case 2. Acute generalized miliary tuberculosis. Clinically regarded as typhoid fever; perforation of a duodenal ulcer with operation and repair. Typhoid bacilli in pure culture from the blood on the 10th day of the disease; blood culture later negative. Widal reaction negative No lesions of typhoid fever found at autopsy.

J. F. Colored laborer, aged twenty-six years, was admitted on September 11, 1916, and died on October 4. His general health had been good. There was no history of typhoid fever. Ten days before admission he was taken with fever, malaise, headache, and anorexia, followed after a few days by abdominal soreness and slight cough.

On admission he was rather dull and presented the general picture of an acute febrile disease. The lungs were clear throughout; breathing, not rapid. The abdomen was scaphoid; the right rectus, held a little more tense than the left, especially in the upper portion. Slight general abdominal tenderness. The liver and spleen were not felt. The eye-grounds were normal. The red blood cells were 4,600,000 with 90 per cent of haemogloblin; the leucocytes, 2300. The urine showed febrile characteristics; the stools were normal. The Widal reaction was negative, but blood culture made on day of admission yielded B. typhosus in pure culture. This organism was identified by the usual cultural reactions, and by agglutination with a stock immune serum. A blood culture made twelve days later was, however, negative.

The patient was regarded as a case of typhoid fever and treated accordingly, but at no time did he respond well. The temperature was persistently elevated, ranging from 100°F. to 103.5°F, and the pulse was labile, varying from 75 to 140, for the most part between 100 and 110 with constant pulse-temperature disproportion. During the first two weeks there were at times well marked abdominal distention and some tenderness, though never any localized muscular rigidity or appreciable alteration in the leucocyte count. He took tubs badly, becoming chilled and cyanotic and complaining of muscle cramps following the treatments. Widal reaction on September 19 was again negative. On September 22, he complained of abdominal pain most marked in the epigastrium. There was moderate abdominal distention, but no other objective change. The pain persisted, and on September 23, he vomited several times, the first specimen containing a small amount of blood. On September 29, there were several attacks of hiccough which recurred at intervals during the next few days. On October 3, he complained of sudden sharp abdominal pain most marked in the epigastrium, so severe that he moaned and writhed in agony. The pulse was weak, rapid and threadlike and the facies anxious. The abdomen became rapidly distended and in forty-five minutes the liver flatness had disappeared. There was no dulness in the flanks, the abdominal respiratory movements were limited, the walls tense and there was exquisite tenderness, especially in the epigastrium. The leucocytes were 2640; 80 per cent, polymorphonuclear cells. The patient was immediately brought to the operating room, and on opening the abdomen, Dr. Dandy found that there was perforation of an ulcer situated just below the pylorus. This ulcer was moderately indurated and in no way distinguishable from the usual peptic ulcer. The ulcer was partially excised and the defect repaired with omentum.

After the operation the patient became conscious although he was very drowsy. His pulse became weaker in spite of repeated stimulation, and he died within ten hours.

Autopsy (no. 4886). Eight days after death (Dr. Lyman). Anatomical Diagnosis: Fibrous pleurisy; caseous tuberculous cervical, bronchial and mesenteric lymphadenitis; tuberculosis of the lymphatic duct; general miliary tuberculosis; tuberculous fibrinous pleurisy. Duodenal and gastric ulcers; (operation; repair of a perforated duodenal ulcer).

Body was that of a poorly nourished colored man 176 cm. in length. There was a right rectus abdominal incision some 12 cm. in length.

On opening the abdomen there was a small amount of bloody fluid in the peritoneal cavity, but no extensive peritonitis. In the upper quadrant there were a good many fine adhesions and there was a slight adhesion of the omentum at the upper angle of the incision. This was very easily separated.

There was a good deal of discoloration of the flexure of the colon where it was adherent to the liver. The colon was separated from the liver and the pyloric region brought into view. Here there was evidence of a surgical operation. A tag of omentum had been sutured to the wall of the duodenum just at the pylorus. The suture line was around an area about 2.5 cm. in length. There was no very definite thickening of the pyloric ring region or sign of inflammation within the ring.

Lungs: the right lung when removed weighed 890 grams. It felt quite firm and tended to stand when it was laid on the table. There were little pinkish-white nodules from 2 to 6 mm. in diameter over the entire surface, and the upper right apex showed thick granular areas where the adhesions were broken at the time of removal of the lung. There was nowhere to be found any normal crepitation except a little at the edges of the lobes. On section the lung showed many little pinkish-white nodules scattered throughout the parenchyma. The left lung weighed 1035 grams and showed the same picture except that the upper lobe showed old pink fibrous tags over the entire pleural surface. There were immense caseous and black lymph glands around the branches of the trachea and bronchi. These lymph glands measured from 5 to 8 cm. in diameter. There were also lymph glands along each side of the trachea.

Spleen was quite large and very firm. It weighed 400 grams. It measured 14.5 by 11 by 7 cm. The entire surface was studded with pinkish-white nodules similar to those seen in the lung tissue.

Stomach, duodenum, and pancreas were removed together. There was very slight induration around the pylorus. No marked signs of inflammation. Posterior to the pylorus and slightly above was a large gland measuring about 4 cm. in diameter, which on section was very caseous and contained pus. On opening the stomach and duodenum the most striking thing was a very large ulcer just below the pylorus measuring about 2.5 cm. in diameter. There were no tubercles to be seen on the edge of this ulcer. Just above and posterior to this was an ulcer which had perforated. The closure seemed to be perfect.

Liver weighed 1510 grams and was everywhere quite smooth except for a good many pin-point white spots scattered over the surface. The entire organ was of a rather darker color than normal, which was due to post mortem change. On section these same little pin-point spots could be made out throughout the parenchyma. The parenchyma was of a very dark brownish color and it was hard to make out the lobules. The organ measured 33 by 20 by 7 cm. It was rather firm and had a normal thin edge.

Gall bladder looked normal.

Lymph glands: there was quite a marked increase in size of the lymph glands in the mesentery and in the thoracic region. Those of the mesentery

were about a centimeter in diameter. There were one or two larger glands posterior to the stomach which were about 4 cm. in diameter. In the thorax were several large ones about the hilum of the lung and along the trachea. Those around the trachea looked quite black but in certain areas showed definite caseation.

Thoracic duct: the thoracic duct seemed to be somewhat distended in the lower thoracic region but at its upper end was transformed into a cord-like structure for about 2 or 3 cm. It was opened with difficulty because of this hard thickening of its wall. The obstruction seemed to be due to a marked caseation in the wall of the duct. Below this the wall of the duct was fairly normal. Smears and sections were taken of this caseous material.

Intestines did not show any marked abnormality on the peritoneal surface but on opening them it was quite evident that there were occasional white spots on the mucosal surface which were about 5 mm. in diameter. These were found throughout the intestines. There was no marked lymphatic hyperplasia and the Peyer's patches were normal. There was no ulceration at any point in the bowel. There was very little injection of the mucosa.

Microscopical notes. Lungs show thickly scattered tubercles.

Spleen: sections of the spleen show a tremendous engorgement as well as a great number of tubercles which destroy its normal picture. These tubercles show large cellular areas with considerable hyalinization which takes a deep stain. There are some giant cells. Besides the engorgement of the spleen with blood cells, there is a marked increase of the connective tissue in the trabeculae.

Stomach and duodenum: section of the ulcer which was immediately below the pylorus shows a definite necrotic edge which is quite thin, and very slight infiltration of round cells and of polymorphonuclear. No tubercles could be made out in this thin necrotic tissue at the edge of the ulcer.

Liver shows definite post mortem changes. There is in certain parts only a slight infiltration of round cells in the periportal areas. Elsewhere there are definite miliary tubercles, which take a deep stain and show a marked round cell infiltration. There is as yet very slight formation of connective tissue.

Lymph glands show definite caseation and tuberculosis.

Intestines: sections of intestines show no abnormality. No hyperplasia of solitary lymph follicles or Peyer's patches.

DISCUSSION

The significance of the typhoid bacteriemia in these cases must remain largely speculative.

The coincidence of typhoid fever with other diseases has been frequently reported although most of the cases are unsatisfactory. Thus it is certainly gratuitous to assume more than typhoid fever in the cases reported by Meissner (2), as typhoid fever occurring during the course of scarlet fever. In Lyon's (3) case of combined typhoid and malarial infections there was no Widal reaction nor demonstration of typhoid bacilli. McCrae (4) states that typhoid fever and miliary tuberculosis may occur together but quotes no reference. Other similar instances might be mentioned. Secondary pyogenic infection during typhoid fever is, of course, a matter of common observation, but is in no sense to be looked upon as a coincidence of two usually independent diseases. In these two cases, furthermore, the complete absence of characteristic lesions of typhoid fever would make it seem most unlikely that a combination of typhoid and miliary tuberculosis was present.

The occurrence of typhoid fever without typical lesions has also been considered in the literature. Flexner (5) discusses the matter completely and reports cases. His bacteriological studies, however, were all post mortem. Stadelmann and Wolff-Eisner (6), report a case of clinical typhoid fever with positive blood culture and Widal, but with extremely insignificant lesions at autopsy,—slight swelling of intestinal lymph follicles with two small ulcers. Jores (7), on the other hand describes as typhoid sepsis a case of an acute, fatal, febrile illness with arthritis, B. typhosus being recovered post mortem from the blood. It seems necessary, therefore, to distinguish very clearly between typhoid fever, a disease with definite clinical characteristics and pathological lesions,—the enteric fever of the English and the abdominal typhus of the Germans,—and other infections with or without invasion by the typhoid bacillus. Under the latter heading must come post-typhoid lesions due to the typhoid bacillus, many of the instances reported in the literature as typhoid fever without typical lesions, as well as these two cases.

As regards the source of the organisms it would seem most likely, as suggested by Busse (8), that in the cases herewith reported, the individuals were carriers of typhoid bacilli and that the invasion of the blood stream was accidental or secondary (9). Evidence in favor of this possibility, namely the recovery of typhoid bacilli from the organs, especially the gall bladder, at autopsy is unfortunately lacking, as post mortem cultures were not made in the first case, and in the second a period of eight days elapsed before section. The absence of history of typhoid fever, the absence of positive Widal reaction and the transient

character of the bacteriemia in case 2 are also of interest. Busse's idea that tuberculous intestinal ulcers may have been a portal of entry in his cases, suggests that invasion in case 2 may have been associated with the gastric ulcers.

There is no a priori reason to believe that generalized tuberculous infection predisposes to invasion by typhoid bacilli, and real information on this point could only be obtained by extensive clinical bacteriological studies.

In summary, then, the two patients here reported are probably to be looked upon as cases of miliary tuberculosis in whom an accidental invasion of the blood with typhoid bacilli occurred. A previous carrier state would most adequately explain the source of the organisms.

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THE CONTROL OF THE CARELESS CONSUMPTIVE [1]

DAVID R. LYMAN

Gaylord Farm Sanatorium, Wallingford, Connecticut

At the International Congress on Tuberculosis held in Washington in 1908, the following resolution was adopted:

Resolved: That the utmost efforts should be continued in the struggle against tuberculosis to prevent the conveyance of tuberculous infection from man to man as the most important source of the disease.

This congress in common with all other congresses or commissions that have studied the causes of tuberculosis unanimously agreed that *the* one great essential for the prevention of this disease is proper control of all open cases, including segregation of all those who cannot be kept under proper control in their homes. Two recent reports which emphasize the importance of such measures are "The Study on Tuberculosis Families in Their Homes," issued by the Association of Tuberculosis Clinics and The Charity Organization Society of New York City, and the "Report on Tuberculosis of the Committee Concerning Causes of Death and Invalidity in the Commonwealth of Australia."

The first of these states that the possibility of any broad constructive programme for the care of dependent tuberculous families "must be determined by the attitude of the health authorities as to the degree of control they are willing to exercise over the avowedly dangerous foci of infection; the active cases living under improper home conditions." It goes on to state that, "The final responsibility here undoubtedly rests with the medical profession. Until they are willing to sanction the wholesale segregation of dangerous tuberculosis carriers, as they have sanctioned similarly the segregation of other infectious, preventable disease carriers, public authorities and private agencies alike can do little but mark time. The principles underlying the control of tuberculosis, segregation, supervision and adequate relief, have been recognized for a decade. There has been lacking only the willingness

[1] Read before the Connecticut State Conference of Charities and Corrections, May 1, 1917.

to follow the application of these principles through to its logical conclusion."

The Australian report, speaking of the need of hospital provision for tuberculous cases who are receiving sick pension, says, "Your committee is of the opinion that legal power should be given to order the removal to the hospital of any such case, as it is obvious that any claimant for pension will be in such financial circumstances as to render adequate precautionary measures impossible."

We are universally agreed that the greatest cause of the spread of tuberculosis is the uncontrolled (too often the unrecognized) open case. We are also coming more and more to agree that tuberculosis is a disease of childhood, that we must seek out and treat the really incipient cases in the children, especially in those of tuberculous families, and that we must try to protect the children from contact exposure.

The International Congress of 1908 voiced as the consensus of the world's opinion the resolution that we should concentrate our efforts toward the prevention of the spread of tuberculosis by direct contact from man to man. How have we responded to the stimulus of this pronouncement? Practically not at all! I do not mean to belittle the great work of the tuberculosis crusade of the past ten years, nor do I underestimate the value of the advance in the relief and educational measures which we have developed. I do mean to say, however, that so far as concerns any real attempt to further the prevention of tuberculosis by direct efforts to control its spread from man to man, we have done practically nothing. Only four of all our states have passed any special laws looking to the compulsory segregation of careless consumptives. New Jersey in 1911, New York, Wisconsin and Minnesota in 1913, passed special laws covering these cases. The details of these laws and other tuberculosis legislation in the United States can be found in Pamphlet 104 of the National Association for the Study and Prevention of Tuberculosis, and I will not take up your time with a discussion of them. In certain other states, as with us, segregation is provided for in connection with some special act or general health bill. But whatever the manner in which it is provided, be it direct or indirect, all these laws are open to the same objection,—they are never enforced. As yet we have not even got up our courage to the sticking point of enforcing our anti-spitting laws. We are gradually educating the public out of this habit and have largely controlled it through prominently posted threats of punishment. It is, however, only spasmodically and in

isolated instances that we make any effort to enforce the law when it is disregarded; and the individual who lodges a complaint under this law is looked upon as a crank and a nuisance, or else as a seeker after notoriety.

Connecticut apparently solved the problem of providing for segregation quite simply, by declaring tuberculosis one of the communicable diseases, and thereby bringing it under the control of the act which already gave all health officers power to order such cases into confinement. We would indeed have made a brave showing among our sister states but for one unfortunate oversight. This was that no place was provided where these cases might be kept under confinement, save the jail; and even the sanatorium workers and visiting nurses would hesitate to countenance the use of that institution for such a purpose. In other words, while we can lay technical claim to being one of the states that have shown some inclination to deal with the matter intelligently, we have in reality done absolutely nothing.

My object to-day is to try to give this conference some concrete idea of just what the need is in this state for an adequate control, by forcible segregation, of these criminally careless cases. I must at the outset confess to a more optimistic viewpoint than that taken at a recent legislative hearing by the superintendent of one of our penal institutions. Basing his estimates on his experience with similar cases in Massachusetts, he told the committee that to care for these cases we should need an institution of 500 beds which would in time have to be increased to 1500; or over double the fairly generous provision Connecticut now makes for her law-abiding citizens. I think that in making this estimate his vision must have been more or less blurred by fear lest his own pet ox meet with an accident; for I can hardly conceive of the morals of our sister commonwealth of Massachusetts being in such condition as to substantiate those figures.

To try and visualize the situation more accurately, I have gone over the records of our state sanatoria for the past three years, during which period the Tuberculosis Commission has kept in a "trouble file" the data concerning every case discharged for infraction of rules. These do not of course cover all cases needing segregation in this period; but as the law does not permit of cases of tuberculosis being cared for in the town farms, these figures will cover the large majority of dangerous pauper cases arising in that time.

In these thr.e years we have, under the act which prohibits our keep-

ing cases who are a menace to the welfare of the other patients, discharged 167 patients, for the following causes in order:

Drinking and bringing liquor on grounds	92
Overstaying leave of absence, usually due to drinking	34
Fighting	14
Vileness of language and habits	13
Infraction of sanitary rules	12
Refusal to take infirmary treatment	12
Drunk and fighting (both)	6
Immorality	4
Attempted suicide	1
Distributing "dope" to patients	1

The Tuberculosis Commission fully realizes the danger to the communities of sending these cases back to their homes, but in justice to our other patients who want to get well and who are worth helping, we could follow no other course. We have tried to minimize the danger by giving every case that was not too impossible a second, and at times a third, trial at one of the other institutions, and often this has sufficed; but where it has not, we have finally discharged the patient and refused to readmit him. We found that so long as we took the burden of these cases entirely on our own shoulders, the town authorities were not interested in the problem at all. Just as soon, however, as we began putting this burden back on the shoulders of the towns we succeeded in securing their interest even if we did not get their commendation.

These sanatorium trouble files only present one side of the question, however, for there are many of these cases who can never be persuaded to go to a sanatorium, or who, if they do go, rebel against any discipline and go home almost immediately. I asked several of the visiting nurses to give me the records of a few of their troubles in this line, and the following cases are from the reports they have kindly furnished me:

Case 1. A man who went to Shelton and remained one week but was dissatisfied and came home. There were three small children and the wife was pregnant. This man positively refused to take any of the ordinary precautions, and when after a few months he was in a dying condition his wife was delivered of a baby in the same bed in which he lay dying. Now the wife has tuberculosis and must go to the sanatorium; the oldest boy is a suspicious case, and the other child also needs constant supervision.

Case 2. A married woman, open case, who refused sanatorium treatment and also refused to observe the ordinary rules of cleanliness. She spat on the floor and did everything that she should not do. The two children had the

measles when I called and the boy was in bed with the mother. Later the mother was almost forced to the town farm infirmary after one child had died. The husband now has tuberculosis and is at Shelton sanatorium. The woman died. The little girl is a delicate child who requires constant supervision.

Case 3. Peter ——— is a man without a family, who bums around town, eating at restaurants, spitting anywhere and everywhere; was at a sanatorium, but insulted and beat the attendant and was discharged. Then was sent to Shelton but got in trouble and was discharged from there. Now he roams around and does as he pleases.

Case 4. A man living with his wife and four children in two rooms, refuses to live any other way, sleeps with wife and the children all in the same room; does not observe any precautions. He also went to the sanatorium but stayed only two or three days.

Case 5. Married man with six children, positive sputum, wife went out working and children were left at home; no one to care for them but the man who was in bed almost all the time. Man was very careless about expectorating. Children were climbing on the bed and crawling on the floor where sputum was found. After much persuasion man went to sanatorium where he stayed only eleven days and returned to the same home and surroundings.

Case 6. Man, positive sputum, specific, boarding with sister who has two small children, using same dishes as rest of family. Was in sanatorium; would not stay.

Case 7. Married man with wife and two young children living in one room, all sleeping in same bed. Man positive case, no precautions whatever taken by patient or any of family. Patient refused any kind of treatment.

Case 8. Young man who is a ne'er-do-well refused sanatorium treatment. Goes from one lodging house to another; careless in every way; does not see any reason why it isn't just as well to spit in sink as in sputum cup. Impossible for visiting nurse to do much with this man unless some one has authority to make him do what he should.

Case 9. Married woman, positive case, cares for three grandchildren whose mother (patient's daughter) died of tuberculosis. Patient will not coöperate in any way.

Case 10. Young girl, positive case, specific, and immoral; refuses sanatorium treatment and in all probability the rest of the family are tuberculous, but have refused examination. From this description of the case it is easy to see how she spends her time and how she is a menace to any community.

You can see by the above reports that the criminal or careless consumptive is indeed a problem in our state work. Lampson, in his Minneapolis studies of the incidence of tuberculosis in families with and without a known tuberculous member, found where there was no

previous known case of tuberculosis that evidence of the disease was present in only 2.5 per cent of the family group. Where known open cases were present, however, he found that 67.5 per cent of the family group showed some tuberculosis; and he further states that he never failed to find a spread of the infection where there had been definite proved exposure to open tuberculosis in the family.

In the light of such studies what is the use of our keeping on closing the stable after the horse has gone? Why spend our taxes caring for the developed active case in the adult and permit this continued inexcusable infection of the children to go on? If we are to command the commendation and support of intelligent people for our tuberculosis campaign we must begin at once to work for the provision of quarters where these cases can be committed by the health officer for such time as he decides the safety of the public demands, be this long or short. We would not face an enormous expense for we would *not* need an enormous institution. The mere fact that there was a place where they could be committed and kept would keep a large number of these cases out of trouble.

This has been proved in the experience of the Connecticut Tuberculosis Commission in applying the simple disciplinary measures at our command. Three years ago when we began to enforce discipline we had to deal with three or four such cases a week. Now we hardly have as many a month, for the patients have found that persistent misbehavior bars them permanently from the comforts of the sanatorium. So with the detention hospital. The knowledge, that the community possessed the means and the power to curtail his liberties and privileges for so long as might be necessary, would make many a patient in the cities as well as in the sanatoria much more ready to consider the rights and privileges of others.

Nor is it necessary to provide expensive sanatorium care. All that is needed is shelter, food, medical care where indicated, and all under police control. All else is wasted effort, for if any case so committed gave evidence of being ready to do his part he could be taken on probation to one of the sanatoria.

The Appropriations Committee has taken favorable action looking to the permanent establishment of the experimental farm for inebriates at Norwich; and you will note that considerably over half of our 167 trouble file cases could qualfy for admission there. It seems to me, now that the farm has been made a permanent institution, that the logical

way to meet our problem would be by the establishment there of a pavilion for tuberculosis where the health officers of our state could order segregated all cases that were proving a menace to the safety of the community.

We know that these cases are the ones that must be controlled if we would prevent tuberculosis. We know that every year and month and week they are infecting helpless children whom we should protect against them. We know that the cost of giving partial health and comfort to these same children later in life will more than balance the cost of preventive measures for segregation now. Why then do we hesitate to do our plain duty in this matter? Usually the opposition is based on some sentimental feeling that compulsory segregation is overriding the constitutional rights of man. We have met that issue as regards all the other and far less dangerous contagious diseases. Why not tuberculosis? Does any one dare maintain that the constitutional right of a responsible adult to do as he pleases is greater than the constitutional right possessed by every child that is helpless to determine its own surroundings,—the right to receive from the community every reasonable chance to bring to its later tasks of life a sane mind in a healthy body.

EDITORIAL

PREDISPOSITION

Names stick but jargon changes. Mental fog promotes euphoria while sharper concepts of natural phenomena entail a certain amount of psychic disturbance and upset. The human mind affectionately gathers to itself and holds on to those *words* that explain everything and mean nothing. The satisfying thing about such terms is that they explain everything because they mean nothing. And because no one is called upon to define exactly what is meant by the terms and to analyze data that support them, everyone understands; and a universal *Weisheits-verein* reigns content. Was there ever a prettier concept than that of the Harmony of the Spheres? What though neither the spheres nor the harmony thereof could be proved to exist in nature? What mattered it? Every man could understand spheres and he could understand harmony. He could therefore understand the Harmony of the Spheres; and he did understand it. And on paper he drew beautiful, complete, and thoroughly understandable, explanatory diagrams. But,—he was drawing diagrams of the *Harmony of the Spheres*, a figment of his imagination, not of the universal plan.

It ill becomes us to sneer at these old masters. Let us not ridicule them. Before casting the stone of superiority let us first wash our own linen and be pronounced clean. Let us first make certain that we have since travelled far upward and beyond the vision of those honest savants,—those men who sought to learn not that they might out-buy their neighbor in the market place but because an insight into causes was as necessary to their life as it is to the child's.

It was not so very long ago that the idea that, unless it was set up by accidental trauma, any disease could be produced by a something that gained lodgment in the body from without was practically non-existent. There was likewise no idea that a disease could be brought about by a deprivation of an invisible or insensible something. In explaining the causes of disease the favorite terms were diathesis or constitution, disposition or predisposition. To us of to-day who know that scurvy is due to the absence in the diet of certain necessary acids,

it would be nothing less than amazing to read of the scorbutic diathesis, were we not familiar with the point of view of two centuries ago and the reasoning that fashioned it. Scorbutic, nervous, dartrous, mucous, scrofulous diathesis, constitution or predisposition, were then favorite terms used to explain causes. And by the term diathesis or predisposition was meant an innate, inborn or native tendency of the individual because of which he fell ill with a particular disease. No particular definition of the essential nature or mechanism of this predisposition was ever attempted. It was not put forward because no one had the least idea of the underlying innate forces that brought about or made up this tendency. Predisposition was a satisfying term that conveyed an explanation, yet if we try to analyze what it meant we soon discover that it really did not explain a single thing. It stood for nothing tangible, it had not a single demonstrated fact to stand on. Its use exhibited a singular twist or quirk of the human mind,—the passion to grab at a meaningless term (so far as any possibility of proof went) to explain a series of mysterious phenomena. This passion is deep rooted and universal and ages of scientific achievement have not sufficed to wipe it out. Increment of knowledge has translocated it, it is true, but it is questionable whether it has much abated it, if the concomitant conditions are at hand. Do we not still speak of a lymphatic constitution or diathesis? And in this respect have we advanced much beyond the "benighted" ancients? Is the point of view any different than theirs,—or any less deadly to rational growth?

In pre-Villeminian times it was a predisposition that gave birth to consumption and tubercle. If an individual had inborn in him a peculiar tendency, a tendency that was non-the-less hypothetical, then catarrh, bronchitis, pneumonia, and what not, were bound to go on to cheesy patch and, therefore, consumption. Similarly, tubercles appeared in the lungs of many because the latter had been brought into the world with a constitutional vice that responded to the stresses and accidents of life with the production of tubercle. Consumption, and tubercle as well, were efflorescences of a something that came into the world with the birth of the affected individual. So far and no further did *predisposition* go; pure hypothesis—we almost said, pure moonshine. In this idea there was not the remotest suggestion that a foreign body from without was responsible for the bodily alteration that brought about disease. By mid-nineteenth century the predispositionists were having their day and they surely were making the most of it.

Then the ugly fact stuck up its head. Villemin showed that he could arouse tubercle in any animal at will. All he had to do was to introduce the proper stuff from the outside. But Villemin could not resolve this stuff into its elements. He could only talk of infectious material or of a virus, again a hypothetical something or nothing. And because he could not exhibit his infectious material in its form or substance, he could not put down the predisposition phantasm.

Then Koch! Here at last were the particles that would give rise to tubercles and consumption; the particles, too, that could be recovered from tubercle and consumption. So away with predisposition,—that hypothetical, native, bodily vice! Why prate about predisposition to tuberculosis any more than about predisposition to measles? Here are the living mites that enter the body of man and there maintain and propagate themselves and there break down tissue and produce disease. Where is your native tendency or vice?

But not so fast! We all agree that the only cause of specific tubercle is something that comes from without, but this does not explain why some individuals contract tuberculosis while many others escape. There still remains a predisposition,—not a predisposition in the sense of an internal dynamic force that must eventuate in tubercle under the right conditions, but a predisposition that offers comparatively slight resistance to the implantation of the tubercle bacillus.

What a radical change in the point of view! But does predisposition to the tubercle bacillus convey any idea or concept whatever, that is a bit more concrete than the old predisposition to consumption? We substitute one set of fuzzy ideas for another, and we thereby make ourselves more comfortable. But we carry over the same terminology and with it a certain amount of the old erroneous view that remains implied.

Time goes on. Predisposition comes to mean certain physical abnormalities or types of bodily formation or inherited "essences" that lay us more open to the tubercle bacillus and its onslaughts than is usual. Then Naegeli makes known his work and Pirquet gives us a method to study infection in the living. We learn that given the opportunity for exposure practically all men harbor the tubercle bacillus and react to it with the characteristic anatomic change, tubercle. What then becomes of our idea of predisposition to tuberculosis,—to the tubercle bacillus? If there is no special native resistance to the implantation of the tubercle bacillus, if the tubercle bacillus can attach itself to the tissues of every-

one alive, what of particular predisposition? We must, of course, give up predisposition as a *deus ex machina*.

Again, not so fast. We will simply change the point of view but cling to the old explanatory term. We will now say that there is no predisposition to *infection*, but there is a predisposition that sooner or later makes infection real to its possessor, that converts infection to the dignity of disease. Predisposition is a good old term. The ancients used it, the mid-Victorians used it, and even though we seek to explain a totally different thing with it, we will continue to use it, just so long as no one demands that we define precisely what we mean. We really do not mean anything more definite than did the ancients and mid-Victorians, but so long as everybody understands us what is the difference? If our pupils ask us why tubercle remains tubercle we will answer, "Resistance!" If they ask what converts tubercle into tuberculosis we will reply, "Predisposition!" It really explains a lot if you have outlived your youthful insistence for sharpness, clarity and definiteness.

To-day, therefore, we find that there is no predisposition to consumption and tubercle in the sense that in us is born a constitutional characteristic that on occasion develops *spontaneously* into consumption and tubercle. And since all of us become tainted with the germ, there is no particular predisposition to infection. But we are still taught that predisposition determines the direction that tubercle will take. Let us see.

From perfect health a human being is precipitated into miliary tuberculosis, the most explosive of all manifestations of the might of the tubercle bacillus. Why? "Predisposition," you say. He dies and we section him. And we find,—close to a vein or the thoracic duct lies a gland that smoldered for years with subclinical tubercle, suddenly to erupt into a channel that carried enormous numbers of bacilli broadcast throughout the body. Such is the occasion for miliary tuberculosis in the vast majority of instances; and autopsy reveals that "predisposition" to miliary tuberculosis means a very definite and understandable set of circumstances that are altogether extraneous to any bodily habit, abnormality, or constitution.

Of a sudden another man falls ill with tuberculous pneumonia. Why? "Predisposition," again you say. He dies and we section him. In his lungs we find a large, fresh, caseating, exudative patch. Nearby, perhaps in an upper lobe, is an older, broken-down, caseous area, or a

cavity that has discharged its contents towards a point lower down. Or a caseous bronchial gland has ulcerated and thrown its bacilliferous detritus into a bronchus. Again "predisposition" is laid bare and is found to consist in the bringing of unusual numbers of bacilli to bear at one point.

An athlete runs a race and, after a terrific burst of speed, stops short, stricken with a pulmonary haemorrhage. We put him to bed and soon find that he is ill with acute pulmonary tuberculosis. Why? "Predisposition," you say. "Predisposition to what?" we ask. Was he predisposed before he ran the race? Would he have been predisposed had he never run the race? Did the race "predispose" his benign tubercle to its conversion into the disease tuberculosis? Yes, the race certainly did exercise some effect on his concealed tubercle. But to drag in "predisposition" to explain this effect would be altogether unfair and misleading.

A healthy woman becomes pregnant and throughout pregnancy enjoys good health. She goes through labor, perhaps with an unusual or prolonged second stage. Soon thereafter she develops pleurisy or begins to cough and spit blood. We find that she has tuberculosis. Why? Again, "predisposition." And again we ask, "Predisposition to what?" Had she a "predisposition" altogether apart from her pregnancy and labor? Would she have developed tuberculosis, had she never been delivered of a baby? Is the "predisposition" associated with the unusual strain that she has undergone or is it part and parcel of her constitution? The answer would surely be simple had not someone thought to explain the outcome in terms of predisposition.

Every year thousands of people "catch cold," and of these a small number soon thereafter develop tuberculosis. Again we are told that these few unfortunates become tuberculously ill because of their "predisposition." This explanation recalls to the author a pertinent occurrence that came within his observation several years ago. A physician vaccinated two of his children. No vaccinia resulted and the physician attributed the negative result to the inertness of the virus. Having been present at the vaccination the writer doubted the validity of this explanation, again procured some of the same virus and asked the physician to perform re-vaccination on his children. This was done with the original ineffective virus. One of the boys developed a typical pustule in the area of scarification, but in the other the unusual happened. In the scratch where the virus was applied no lesion developed. But

it happened that some of the virus had trickled down the arm and lodged against the protecting shield. And here where the adhesive band of the shield had rubbed the arm and had made a slight abrasion, the virus "took" and gave rise to as classical a cow-pock as one could wish to see. In other words, the virus was right and the patient was right, but the conditions of the vaccination scratch were not right. Had this boy not reacted to the virus in this accidental way and had he remained refractory, we should probably have decided that he had a predisposition against vaccination.

But where does all this lead us if we deny the innateness of predisposition that lays us open to consumption, to tubercle and to tuberculosis? Simply here,—that we should not use terms unless we have some faint idea of what we mean and are willing to defend their use with rational exposition and demonstration; in other words, unless we know what we are talking about. For a long time it has seemed to the writer that the true function of science is to explain and lay bare the obvious;—not to go a-glimmering after the hypothetical, the gratuitously assumed, and the unknowable. Real science busies itself with inquiries into why an apple falls, why the giraffe's neck is long, why the chill in pneumonia, why the eruption in secondary syphilis. It gets lost in the fog that encompasses such questions as what is gravitation, what lengthens the giraffe's neck, what are these immune bodies we assume to exist as resisting the pneumococcus and what is the nature of the amboceptor that determines complement fixation in syphilis. And when Science, to-day fully conscious of the actuality of the influence of strain, intercurrent disease, pregnancy, and the accidents of location and time, on the development of tuberculosis, busies itself with the effects of these on tubercle, then we shall learn something. And we shall not use the terms agglutinins, opsonins, amboceptors, phagocytes, lipoids, ferments and phosphatids to convey our knowledge. And we shall be rational and be really understood. And the word "predisposition" will require an historical inquiry.

A. K. K.

MEDICAL NOTES, ABSTRACTS AND REVIEWS

It will be the eventual purpose of the REVIEW thoroughly to canvass all literature on tuberculosis as it appears in other medical periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the Abstract Editor, Dr. George Mannheimer, 41 West 51st Street, New York, N. Y.

Tuberculosis and Military Organization.—The program outlined by the committee of the National Association for the Study and Prevention of Tuberculosis in coöperation with the War and Navy Departments provides for: (1) recruiting examinations, (2) reëxaminations during service, (3) treatment of incidental cases during service, and (4) their disposal after treatment. The committee is of the opinion "that any man with even a very limited amount of pulmonary tuberculosis that is latent or arrested is almost certain to break down under the strain of military training and army life and a focus of disease previously latent or arrested will almost certainly become active." The author believes that cases coming under the headings of "evident predisposition to pulmonary tuberculosis," "doubtful cases," cases of "temporary illness," and candidates for special ratings in some instances ought to be enlisted and entered in a service to be created especially for the purpose of observation under working conditions. Such service may consist of work in the rear under the supervision of specially selected medical officers. The "war tuberculosis program" is faulty in so far as it proposes against this disease the same measures that have been found effective against the acute infections. It is the entire vitality and power of resistance of a nation that is on trial and to learn how to husband and strengthen these is the task of true preparation. In this the so called tuberculosis problem is submerged.

Whether the incidence of tuberculosis in the new armies will be lower or higher than that in civil life will depend more on the discipline, morals, and spirit of the organization than on the application of any specific measures. Practically all our prophylactic measures come under the heading of "cleanliness." Clean habits and clean, open air are now our mainstays against tuberculosis. But open air is not of prime importance. The case of tuberculosis in the Indian shows that a hunting and nomadic race has no resistance against tuberculosis when it comes in contact with infection. The Indian's mode of life in the open is likely to prove of only temporary benefit to men accustomed to live under shelter. Fear, anxiety and worry constitute the greater part of nonspecific factors which predispose to tuberculosis. While we will not relax our vigilance as regards the specific causes of infection and the natural variations of specific immunity, we will have to admit, and direct our actions accordingly, that the nonspecific factors which tend to undermine natural resistance are, for the present at least, outside of the reach of strictly medical interference. The "social physician" will have to cope with these problems since, as one social worker said, "the efforts to combat tuberculosis without changing the fundamental errors in our economic life is a futile task."

As regards the institutional provision for tuberculous patients, here also the strictly medical measures will have to play only a minor rôle. A distinction of type of institution will be necessary, but the assignment to them of cases should be based less on the anatomical and bacteriologic findings but rather on the degree of incapacity for definite kinds of work:—*Tuberculosis and Military Organization, A. C. Klebs, U. S. Naval Med. Bull., xi, No. 4.*

Exogenous Tuberculous Infection in War.—The author cannot accept the opinion of Schroeder that the exclusive cause of tuberculosis in soldiers is endogenous reinfection. This is probable in the majority of cases, but not proved in others. A certain percentage can only be explained on the basis of a primary exogenous infection. The danger of a massive exogenous infection is much greater in war than under normal conditions. In spite of all precautions, a goodly number of bacilli-spitters exists among the troops in the field. Predisposing

causes are insanitary housing, colds, digestive disturbances, temporary sub-nutrition and over-exertion. The following postulates are necessary to prove a primary exogenous infection: (1) absence of heredity; (2) absence of habitus phthisicus; (3) absence of suspicious symptoms before the disease becomes manifest; (4) acute or subacute onset of the disease; (5) a virulent type or at least a marked tendency to rapid proliferation, showing that the system has had no opportunity to acquire immunity in response to previous infections. From the strictly limited point of view, 38 cases were found to come under this heading, amounting to 3.8 per cent of the entire material observed.

Conclusions: (1) Although autogenous reinfection is more common, exogenous infection cannot be neglected, especially in times of war. (2) The latter assumes a greater importance on account of the malignancy of the process which leads to massive pneumonic infiltrations, cavitations and miliary dissemination. (3) These experiences teach us to attach more importance to exposure wherever men congregate amidst unhygienic surroundings, even in times of peace.—*Ueber tuberkuloese Exposition und exogene tuberkuloese Infektion unter den besonderen Verhaeltnissen des Krieges, Herm. v. Hayek, Wiener klin. Wochenschr., 1917, No. 1, 2. (transl, from Internat. Centralbl. f. d. ges. Tuberk. Forsch., Feb., 1917, xi, No. 2, 40).*

The Incidence of Tuberculosis Among Soldiers.—When Major Edouard Rist of the Medical Corps of the French Army, assigned by the French government to the Surgeon-General's Office, announced at the meeting of the American Association of Military Surgeons held at Fort Benjamin Harrison this week that the facts concerning tuberculosis in France, and especially in the French army, do not agree with the exaggerated statements published in this country, he settled conclusively a point which has agitated civilian and medical tuberculosis authorities in this country since the beginning of the war. Major Rist stated that out of 1000 men sent back to a base hospital as suffering with pulmonary tuberculosis, all but 193 were returned to the front with the diagnosis not confirmed. He said also that the chief cause of the too numerous diagnoses of tuberculosis was the fact that civilian physicians called to army life are too much inclined to make the diagnosis of tuberculosis on very slight evidence. In making a differential diagnosis the mistakes were not made through the difficulty of differentiating pulmonary tuberculosis from unusual maladies, such as abscess of the lung, or pulmonary tumor, but far more frequently through the confusion of the diagnosis with minor complaints such as infections in the upper air passages, acute rhinitis, pharyngitis and bronchial inflammation. France, in need of every soldier, found it necessary to comb with a fine comb in order that no man be eliminated from the army through a mistaken diagnosis of this sort. The United States, with a supply of men far above the number that can be successfully trained and transported for military service, need not, perhaps, be so careful in eliminating men from military service because of the suspicion of this disease. In any event, making a diagnosis of tuberculosis and eliminating a man from military service for this cause wrongfully is not doing justice either to him or to the nation.—*Editorial, J. Am. M. Ass., October 13, 1917, lxix, No. 15, 1266.*

Pulmonary Tuberculosis and the War.—Beauchant says that he has examined 1206 cases of verified tuberculosis during a recent seven-months' period. This included 258 of a progressive and 948 of a stationary type. He has made a special study of the influence of the campaign on preëxisting tuberculous affections, and has been surprised at the satisfactory service rendered by two out of every three with a history before the war of pleurisy with effusion, hemoptysis, bronchitis with emaciation or severe derangement of the general health. Among the 302 in this category, 118 had gone through with their military duties without let-up, and most of them had been at the front from the beginning of hostilities. That is, 39 per cent had rendered satisfactory service; 25 per cent had also given good service but had had to drop out for a time once; 24 per cent had been sent back two or more times; and 28 per cent had been in the hospital again and again. These satisfactory results were realized with comparatively little damage for the men themselves. In only 10 per cent the disease had developed into a progressive type. In the others it seemed to tend toward sclerosis, and the possibility of a complete arrest can be considered. The progressing cases were among those who had given the best service, and the flaring-up came late in the campaign. In all others the disease was nearly if not quite stationary, including 161 cases of the fibrous form, fifty-nine of the pleural and forty-eight of the attenuated form.

Primary pleurisy was the most frequent form in which tuberculosis developed apparently for the first time in the soldiers on active service. There were 210 cases of a

rapidly progressive type, while the primary fibrous form was observed in 159 cases and the attenuated form in 113. In two cases there was hemoptysis after antityphoid vaccination, and a typical tuberculous pneumonia developed, but the outlook now seems rather inclined to be favorable. In only three cases did the inhalation of drift gas seem to be the starting point for a progressing tuberculosis with bacilli in the sputum. A trauma to the chest is liable to rouse a slumbering tuberculous process. All soldiers with progressive pulmonary tuberculosis should be sent to a sanatorium or dismissed permanently, and every recent manifestation of tuberculosis calls for more or less prolonged repose in the home zone. One cannot be too prudent with pleurisy with effusion. To send such patients back to the front after only a month or two of convalescence is liable to entail the worst consequences. He is convinced that many of the men with progressive lesions owe them to their being sent back to the front after too brief interval for convalescence and recuperation. In his experience, pleurisy with effusion seemed the most menacing precursor of progressive pulmonary tuberculosis, and he is tempted to urge temporary discharge from military duties of all such cases. The best plan would be to collect all these pleurisy, hemoptysis and similar cases in special sanatoriums where graduated out-of-door work would aid them in recovering strength and enable them in time to take their place in the ranks again. At present too often the men pass from the hospital straight back into the trenches.—*Les tuberculoses respiratoires et la guerre, Morichau-Beauchant, Progr. Med., July 14, 1917, xxxii, No. 28, 233.*

Tuberculosis in the French Army.—While tuberculosis in the French Army is a sufficiently serious problem, an analysis of individual reports readily shows that there is much misconception in this regard. Tuberculosis is a civil plague, and in fact was such long before the war, but it has never seemed reasonable or plausible that the picked fighting men could be stricken wholesale with active tuberculosis. A study of several articles shows plainly that only a relatively small fraction of the so-called tuberculous soldiers have, or have had, active tuberculosis. The vast majority present the disease in the latent or stationary form, or else have only adhesions from past pleurisy of presumably tuberculous nature. In one material instance, at least 50 per cent of the alleged "tuberculous" soldiers were doing full duty at the front. It is, of course, true that on a peace footing none of these 50 per cent would be in the ranks.

But the 50 per cent or less who have been invalided naturally make up a great body of men who require hospital treatment, and the real problem consists in finding accommopations for them. This is discussed by Leuret in the *Journal de Médecine de Bordeaux* for July. In the absence of exact data we can only infer that this problem deals essentially with the salvage of lives both for military duty and on general principles. The selection should be along the lines which obtain in sanatorium practice, *i.e.*, the incurable patient constitutes a separate problem. In Leuret's article special sanatoria, wards in general sanatoria, and out-of-door clinics, are all discussed. It is the consensus that 300 beds should be the maximum for a single service.

The movement extends beyond the confines of the actual fighting men, for sanatoria in industrial districts seem to provide hospitalization for the workmen as well, although it is not clear as to whether there is segregation of one or the other class. But these sanatoria for workingmen appear to be under the control of army physicians. The tuberculous soldier who may be regarded as on the road to recovery does light farm labor, which favors the cure, and at the same time makes him useful to his country. Dr. Cantonnet is an enthusiast regarding the "work cure." Other light occupations in the country are also facilitated, so that open-air convalescence is rendered possible for men who take their families with them from the cities.—*Notes on Military Medicine, Med. Rec., November 10, 1917, xcll, No. 19, 810.*

Tubercle Bacilli in Breast Milk.—The authors have examined the breast milk of twenty-eight tuberculous women for tubercle bacilli. Due precautions were taken in obtaining the milk. There was no apparent mammary disease or any suspicion of such, and about 450 microscopic examinations were made in the twenty-eight cases. Specimens from fifteen cases were injected into guinea pigs intraperitoneally, with invariable negative results. Observations were also made on two guinea pigs fed with breast milk from tuberculous women three times daily for a month. No evidence of tuberculosis was found in either. All their results were negative with one exception which may be questioned, and their experiments indicate that tubercle bacilli are rarely found in the breast milk of tuberculous women without mammary disease. The possibility of infection from this source is probably slight,

but it is probably best to interdict nursing in every instance because of the other additional factors that may exist. An exception might be made that the mother with a closed case of tuberculosis might be allowed to nurse her infant, although it is often difficult to distinguish between a closed and open case after pregnancy and labor.—*Occurrence of Tubercle Bacilli in Breast Milk of Tuberculous Women, S. L. Wang and F. Coonley, J. Am. M. Ass., August 18, 1917, lxix, No, 7, 531.*

The Occurrence of Tuberculosis in Children is of paramount importance from the standpoint of making rational provision for the protection of communities. To those who believe that tuberculosis in adults is essentially the result of infection during childhood it must appear reasonable to increase the amount of care and time given to the investigation of tuberculous infections under the age of fourteen. By greater activity and more consecutive treatment during infancy and childhood it may be possible to decrease the tuberculosis morbidity and mortality during the period of greatest economic usefulness.

Standards of diagnosis must necessarily be temporary in character until tested out through years of experience. It is a step in advance, however, to have diagnostic standards devised under the auspices of scientific, sane and conservative experts who recognize the seriousness of tuberculosis but are not tempted to exaggerate signs or symptoms to establish a diagnosis. It minimizes the dangers of confusing this disease with others far less hazardous to the human race. Correct diagnosis can be obtained only by the application of common sense to the consideration of a large varieties of signs and symptoms, local and constitutional which may appear at any time during life.

It is to be hoped that the reports upon these novel recommendations will prove their value or demonstrate their weakness; in either instance contributing to the development of real scientific progress in the control of tuberculosis.—*Editorial Comment, Am. Med., August, 1917, xii, No. 8.*

Bovine Tuberculosis in Children.—Tuberculosis of bovine origin represents, in general, about 25 per cent of all cases of tuberculosis in children under five years of age. It is estimated that in New York City, for instance, between 6 and 10 per cent of the children that die in the hospitals each year of tuberculosis, die of bovine tuberculosis, representing about 300 children a year. Bone tuberculosis represents a type of the disease which for the most part remains localized in a single place. It is unusual to find tuberculosis elsewhere in the body when it is present in some particular bone. The precentage of cases of bone tuberculosis which are due to bovine infection varies very markedly according to to age of the patient. In a series of 68 cases 70 per cent were of bovine origin, but under one year of age all were of bovine origin, and under four years of age at least 78 per cent were of this origin. Glandular tuberculosis was found at an English hospital to be due to bovine infection in 90 per cent of cases, while of 38 cases under five years all but three were due to the bovine bacillus. Unless we have milk coming from a herd which is, in fact, free from tuberculosis, we must pasteurize milk. But unless milk is properly pasteurized, we are again setting up a false standard of security. We ought to exert all our influence to have some sort of inspection or supervision of pasteurizing plants if we are to adopt the general pasteurization of milk.—*The Danger to Children from Tuberculosis in Cattle, R. M. Smith, Boston M. and S. J., November 8, 1917, clxxvii, No. 19, 657.*

The von Pirquet Test.—An investigation of the fatal cases that have come to necropsy from the Harriet Lane Home, of the J. Hopkins Hospital, from November, 1912, to April, 1917, with the view of studying the relation between the von Pirquet reaction and anatomical findings of tuberculous lesions gave the following results: Careful necropsies were performed on 324 infants and children from birth to twelve years of age. Sixty-eight cases were found to have tuberculous lesions, that is, about 20 per cent of the fatal cases. In 61 of these cases a tuberculin test had been performed. Forty-five were positive and 16 negative. Of the 16, 12 were rapidly advancing cases of miliary tuberculosis, 2 were cases of tuberculous meningitis and 2 were far advanced pulmonic cases. In all instances the test had been made from a week to a few days before death, usually several weeks after onset of the illness. Of the 256 cases having no tuberculous lesions at autopsy, the test was made in 172 cases. It was never positive, but negative without exception. No doubtful reactions should be called positive, but the test should be repeated, and those only be called positive where there is a sharp contrast between the tuberculin treated areas and the control sites. Koch's old tuberculin was employed, undiluted, and the scarifier devised by von Pirquet was used.—*The Value of the von Pirquet Test as Controlled by Necropsy Findings, J. H. M.*

Knox, Am. J. Dis. Child., July, 1917, xiv, No. 1, 47.

Diagnosis of Pulmonary Tuberculosis in Children.—In children of school age tuberculous infection is as a rule not followed by symptoms. In the few cases in which infection is followed by disease, the lungs are rarely the site of lesion. It is the bones, joints, serous membranes and especially the glands that are affected. The clinical picture is similar to that in adults. We have to exclude nasopharyngeal affections, valvular disease of the heart, adenoids, etc. On account of its instability, the temperature does not have the same diagnostic value as in adults. Many healthy children have night sweats, but these occur soon after they are put to bed, in contradistinction to those in phthisis, which occur in the early morning hours. The pulse rate is of great importance. When it is less than 80 in a child under ten years, active tuberculosis can be excluded; tachycardia is generally present in tuberculosis. Enlargement of the cervical glands is not characteristic, but enlargement of the supraclavicular nodes is in nearly all cases due to tuberculosis of the lungs. When tuberculosis causes the weight to remain stationary, the disease is as a rule located in the glands, bones or joints and not in the lungs. No diagnosis of tuberculosis should be made unless the lesion is localized in the upper part of the chest. Signs present exclusively in the lower part of the chest should be ascribed to tuberculosis only when the sputum is positive and no other cause can be found. Auscultatory signs are more easily elicited than in adults. Harsh breath sounds or bronchial breathing, over the upper part of one side of the chest, with impairment of resonance, and possibly moist râles, spell tuberculosis. The X-rays are of great diagnostic value, but should only be used in conjunction with other findings. The sputum is positive in most of the cases. The tuberculin test is of no diagnostic value in children over four years; it indicates infection but not disease.—*The Diagnosis of Pulmonary Tuberculosis in Children of School Age, M. Fishberg, Med. Rec., September 1, 1917, xcii, No. 10, 406.*

Treatment of "Pretuberculosis" in Children.—Blumenau is convinced that certain subjective symptoms are the work of tubercle bacilli before they have started manifest tuberculosis. This is particularly evident in children, and he recommends for it tuberculin treatment by the inunction technic. He reports experiments on guinea pigs which apparently confirm that toxins rubbed into the intact skin, after it has been shaved and cleared of grease with ether, pass through the skin as through a special filter, and induce the production of antibodies in the organism. The animals kept well and even increased in weight although they were being given inunctions of diphtheria toxin, by Moro's technic in a 50 per cent ointment, rubbed into scarifications, and they survived then the subcutaneous injection of four times the fatal dose of diphtheria toxin. His experiments on animals were not numerous, but the results were so convincing that he applied the method at once to seventy children. The technic he found most effectual was to apply a drop of pure tuberculin to the forearm and then shave off a scrap of skin through it. The mixture of the superficial layer of the epidermis and the tuberculin formed a thin salve, like lanolin, and this mixture on the back of the razor was then rubbed into the skin until dry. A scrap of sticking plaster was then applied over the spot. When removed twenty-four or forty-eight hours later the skin underneath may display a strong, moderate or weak reaction, and the inunction is repeated after an interval corresponding to the strength of the reaction. The dose of tuberculin is also progressively increased to a total of four drops. At first the intervals are usually three or five days, but when the four drop dose is reached, the intervals are a week. The results in the cases of well defined tuberculosis, especially of the lungs, were what might be expected as these types are scarcely amenable to treatment. But in incipient or occult tuberculosis the therapeutic results were prompt and striking.

He gives a brief summary of eighteen cases of various types. Some of the children were only 9 or 10 months old but the majority were between 2 and 13. One child of 13, for example, had been having for six weeks pains in the chest, head and side, coughed a little, sweated freely at night and felt chilly. The appetite was poor and the child was growing thin. There was dullness over the right apex and the temperature wavered between 36.9 and 38.3° C. The tuberculin inunctions were given for a month, a total of ten inunctions. The reaction was pronounced at first but gradually grew less and less distinct while the improvement was marked in every respect. There were no further pains except occasionally in the left side at night when the child lay on that side. The cough disappeared, the appetite returned and the temperature keeps within the normal range, while the child has increased in weight. One 9 months' babe had long been coughing

and there was a discharge from the ears and from a fistula in suppurating cervical glands, with diffuse dry râles in the lungs. In the course of three and a half months the child had been given twelve inunctions and had increased in weight from 9,000 to 9,500 grams, the cough had ceased, and there was no further discharge from the ears or fistula. The râles had also disappeared.

The parents of children brought to the dispensary often call attention to the child's lassitude, apathy and drowsiness or the reverse, excessive nervousness and irritability, with loss of appetite, restless sleep, frequent and persistent headache, palpitations, cough, pains in the side or chest and in the bones of the arms or legs. The majority of such children are frail and badly nourished but not all present anemia. The diagnosis of "school anemia" should not be accepted until all other causes have been excluded. It is not enough to examine the child himself; inquiry must be made as to the health of the parents and other relatives, whether any of them have had pleurisy or lingering lung trouble, or any children have died from meningitis, and whether there is any one in the building that coughs much. None of the subjective symptoms are pathognomonic of tuberculosis, of course, but when a possible source of infection is known, the tuberculin test will reveal in many instances that they are the work of chronic self-intoxication.—*Pretuberculosis in Children and Treatment with Tuberculin Inunctions, N. R. Blumenau, Russ, Vrach, 1917, xvi, No. 13, 289.*

Tuberculin aud Roentgen Treatment of Tuberculosis in Infants.—This last work from the late Professor Combe brings down to the close of 1916 his experiences with systematic tuberculin treatment of tuberculosis in infants. If the dose of tuberculin injected subcutaneously is adapted to the parenteral digesting power of the babe, the production of antibodies proceeds regularly and there is a general immunizing reaction in addition to a focal cicatrization reaction. If the dosage is excessive, then anaphylaxis instead of immunization is induced. We have in the intracutaneous tuberculin test a reliable index as to what is going on under the influence of the tuberculin injections. Repetition of the intracutaneous tuberculin test at regular intervals shows whether the result is in the line of immunization or of anaphylaxis. He commences with a tenth of a milligram and increases the dose gradually, at three day intervals, up to a decigram or even 50 cg., testing the results with the intracutaneous injection of always 0.1 mgm. every two weeks. The progressive diminishing of the reaction to the Mantoux intracutaneous test, while the therapeutic dose is constantly being increased, shows that immunization is being realized and that the tuberculous process—usually a tracheobronchial glandular affection is healing. If the Mantoux reaction, instead of diminishing, grows more pronounced, the infants are not being benefited, but the reverse, by their tuberculin treatment, and it should be suspended at once.

The therapeutic injections are made intracutaneously. The subcutaneous route proved disastrous in his experience. He explains the reasons for this superiority of the intracutaneous technic. It allows the organism to be tuberculinized without risk when it would be absolutely refractory to subcutaneous injections with which the whole dose passes at once into the blood. He describes the technic for this "mantousation" as he calls it, and states that ten years of tuberculin treatment have convinced him of its reliability and efficacy with localized tuberculous processes in infants and children. But if the tuberculosis is generalized, there is no chance for tuberculin treatment to be effectual, and it is contraindicated. His experience with Roentgen treatment of tuberculosis in infants was still in a tentative stage, but the results were encouraging with tuberculous glands and tuberculous otitis, and the treatment is worthy of a trial, at least, with osteitis. One infant with tuberculous peritonitis and a tuberculous process in the apex had the apical lesion exposed to the Roentgen rays three times at eight day intervals. Necropsy showed the apical lesion arrested and practically walled in, but the thymus was atrophied. If the Roentgen rays are responsible for this atrophy of the thymus, Roentgen treatment in this form is contraindicated for infants.—*Tuberculin and Radiotherapy in Treatment of Tuberculosis in Infants, A. Combe le Nourisson, v, No. 1.*

Vitality of Tubercle Bacillus Outside Body.—It is evident from Soparker's experiments that there is an appreciable period after the complete drying of tuberculous sputum, during which some of the tubercle bacilli contained therein remain alive. In the case of direct sunlight the time is approximately two hours; this interval is not long, and the danger of infection from tuberculous sputum deposited in open places exposed to the sun cannot therefore be considered to be great. In the case of sputum deposited in a place exposed to diffused daylight the interval during which sputum dust may remain infective can be calculated in days.

But here, too, the tubercle bacilli soon lose their virulence if the place be well lighted, the rate at which the tubercle bacilli become devitalized probably depending on the intensity of the light. The danger of spreading infection is greatest when sputum is deposited indoors, especially in dark ill-ventilated places. In these conditions tubercle bacilli may retain their vitality and power to cause the disease as long as 309 days. From decomposing sputum living tubercle bacilli could be isolated after twenty days but not after twenty-six days. Bovine tubercle bacilli were found to be more resistant to sunlight and diffused daylight than human. When exposed to electric light the bovine bacilli were found alive for seventy-four days but dead after one hundred days. It took three to four hours in direct sunlight and three to four days in diffuse daylight for a pellet of sputum to become sufficiently dried to be capable of being reduced to dust. The adoption of suitable building by-laws to insure the entrance of sufficient light and air in all inhabited rooms in houses will do much to combat the spread of tuberculosis.—*Vitality of the Tubercle Bacillus Outside the Body, M. B. Soparker, Ind. J. of M. Research, April, 1917, iv, No. 4, 627.*

The Glucoside Form of the Tubercle Bacillus.—In 1913 the author described a procedure, by means of which he obtained from pure cultures of tubercle bacilli, by maceration in normal salt solution, new forms which were neither acid-fast nor alcohol-fast and differed from the original culture in appearance, growth and virulence. As it it very difficult to conduct this experiment under sterile conditions, Dostal subjected pure cultures of tubercle bacilli to chemical influences. He added to the ordinary glycerine media 5-10 parts by weight of a glucoside, saponinum depuratum Merck. A layer of dry scales from a typical glycerine-agar culture was transferred on a platinum spatula on to solid, usually 10 per cent saponin media. The tubes were closed with guttapercha paper, and the cultures thus kept for months. At intervals of several weeks the cultures were transferred again and again into new tubes of saponin glycerin agar. After repeated transplantations they grew luxuriantly in twenty-four hours, in tender, transparent layers. After the ninth passage, neither acid nor alcohol-fast rods could be demonstrated by staining.—*Die Glykosidform des Tuberkelbazillus, H. Dostal, Frankf. Zschr. f. Path., 1916, Bd. 19. (translated from Internat. Centralbl. f. d. ges. Tuberk. Forsch., xl, No. 1, January, 1917).*

Differentiation of the Avian Tubercle Bacillus.—Ranjil de Nuvais (of Rio de Janeiro) has stated that the avian tubercle bacillus liquefies the medium when grown on carrot juice agar. As a result of experiments with avian bacilli from five sources none of which caused liquefaction, Rochain concludes that the phenomenon is not constant and cannot be used as a differential test.—*Sur un prêtendu charactère differentiel du bacille tuberculeux aviaire, A. Rochair, Compt. rend. Soc. de biol., 1917, lxxx, No. 12, 570.*

Demonstration of Tubercle Bacilli in the Feces.—The method of Reh consists in emulsifying the feces with distilled water, shaking with ether and centrifuging the decanted ether. A comparison of this with the antiformin method showed the same result in 37 cases and in 3 cases a positive finding only with the method of Reh. The author recommends to scrape off a little mucus from the rectal mucosa by means of a grooved director which ends in a spoon-like enlargement, to spread the mucus on a slide and stain it in the usual fashion. With this method 57 positive results were found out of 60 against 44 with the method of Reh. If these findings are corroborated, rectal scraping would be the simplest and best method for the demonstration of tubercle bacilli in the alimentary canal.—*Ein Beitrag zur Frage vom Vorkommen der Tuberkelbazillen in den Faezes, H. Engleson, Beitr. z. Klin. d. Tub., 1915, xxxv, No. 1, 39, (transl. from Internat. Centralbl. f. d. ges. Tuberk. Forsch., Feb., 1917, xi, No. 2, 46).*

Occult Blood in the Stools with Pulmonary Tuberculosis.—Lange examined the stools for occult blood on four occasions, with one day intervals, in 37 cases of pulmonary tuberculosis in the first stage; in 25 in the second stage; and 64 in the third stage—only one in the first group showing any signs of tuberculosis of the bowel, three in the second group, and ten in the third. He also applied the same tests to 34 with bowel tuberculosis as evidenced by clinical or post mortem findings. The findings were positive in all but 3 in this group, and in these the necropsy failed to confirm the tuberculous nature of the bowel trouble. Among the practical results of this study of 160 cases is the warning that tuberculous ulcerations in the intestines may long exist without giving rise to bleeding. Also that tuberculous intestinal lesions are more common with pulmonary tuberculosis —even in the total absence of all signs of the bowel involvement—than would be

supposed from the clinical symptoms. The occult blood findings were negative in all the 37 in the first stage after the effect of blood-containing food had worn off; in the 25 in the second stage, the findings were positive in three. In the 64 in the third stage, four of the ten showing signs of intestinal tuberculosis gave a positive benzidin reaction. Of the eleven giving a positive reaction, four also showed signs of intestinal tuberculosis.—*Occult Blood in the Stools with Pulmonary Tuberculosis, K. W. Lange, Ugeskr. f. Laeger, August 9, 1917, lxxix, No. 32, 1371.*

Tuberculosis and Cattle Breeding.—Byre-life plays a pathogenic rôle in the spread of tuberculosis in cattle, not only by lowering the resistance of the animals confined, but also because of the presence of dust. The dust of byres and of hay favors the entrance of the tubercle bacillus by irritation of the pulmonary epithelium. The larger the byre and the greater the number of animals brought together the greater is the percentage of animals infected. It is therefore better to build small byres rather than to bring many animals together in one building.—*Tuberkulose und Tierzucht, U. Duerst, Schweiz. Arch. f. Tierheilk., February, 1917, lix, No. 2, 65 and No. 3, 154.*

Diagnosis of Tuberculosis in Cattle.—The authors consider that measures for the suppression of tuberculosis in cattle have hitherto been directed against known cases of infection, while the protection of healthy animals against unknown spreaders of the disease has been neglected. Without detracting from the importance of fresh air, sunlight and cleanliness, it is the authors' opinion that exchange of the older methods of individual segregation has not contributed to the suppression of the disease. In 1911 a small experimental herd, consisting of reactors and non-reactors, was established at the Experimental Farm of the New York State Veterinary College, where animals were closely associated with each other. In January, 1917, about 50 per cent of the herd had to be condemned and one-third of the remaining animals were tuberculous. Susceptible animals acquire the disease in a comparatively short time after exposure. Previous non-reactors became reactors at an average of one and a half years, so that the period of incubation must have been considerably less. Young animals were found more susceptible. Many tuberculous animals developed into open pulmonary cases. All of the diagnostic methods are far from perfect; the value of each is purely relative and increases when used in combination with other methods. The value of the sputum cup is yet to be established. It is evident that the cow must become a spreader before recognition by this method is possible. Physical examination alone is a failure in the suppression of tuberculosis.—*A Further Report of the Diagnosis of Open Cases of Tuberculosis, D. H. Udall and R. R. Birch, Cornell Veterinarian, January, 1917, vii, No. 1, 13, (from Veter. Rev., August, 1917, i, No. 3, 293).*

Tuberculosis in Cattle.—In beef cattle the bovine tubercle bacillus is not prevalent, but in dairy cattle, especially in the eastern states the organism occurs in from 10 to 30 per cent of the cattle furnishing milk and milk products to our large cities. The muscles of the animals are seldom diseased and the heating of the meat renders it quite safe. The bacilli survive for months in the manure and since nearly all milk contains some manure, the bovine bacillus will at times be present in milk. Figures taken from Rosenau show that in cities like New York, Chicago, Washington and Rochester 5-16 per cent of milk samples contain the bacillus. Cream contains several times as many bacilli as the milk; the bacillus is also present in butter and cheese where it has been shown to survive for months. Two measures are available for the prevention of bovine tuberculosis in man: the elimination of tuberculous cattle and the pasteurization of milk. The disease may be unsuspected in a healthy looking animal, and may remain so for years, to infect other animals and to seed the milk. The most efficient prophylactic method is the employment of the tuberculin test, which is harmless. Given the information regarding the occurrence of the disease the animals which are found badly diseased may be destroyed while the slightly diseased reactors are separated from the remainder of the herd and are used for breeding purposes, the calves being removed as soon as dropped. The milk may be heated and fed to other stock or calves. This practice will eliminate bovine tuberculosis in man.—*Tuberculosis in Dairy Cattle, C. M. Hilliard, Boston M. and S. J., November 8, 1917, clxxvii, No. 19, 654.*

Rabbits and Experimental Human Infection.—The authors tried to infect rabbits by means of inhalations and intravenous injections of human tubercle bacilli, but found the animals refractory even to very large doses. Rabbits should therefore not be used for experiments with human tuberculosis, especially not for therapeutic

tests.—*Ueber die Verwendbarkeit der Kaninchen zu Arbeiten mit menschlichen Tuberkelbazillen, H. Selter und J. Buergers, Zentralbl. f. Bakteriol., 1916, lxxviii, No. 4, 288. (transl. from Internat. Centralbl. f. d. ges. Tub. Forsch., February, 1917, xi, No. 2, 43).*

The Intracutaneous Tuberculin Reaction in Experimental Animals.—The author made the intracutaneous tuberculin test on nearly 1000 guinea pigs, which had been inoculated for diagnostic purposes. In this way, a positive reaction can already be ascertained ten to twelve days after the inoculation of infectious material. The method is quick and can be corroborated by the subsequent autopsy of the animal.—*Die Bedeutung der intrakutanen Tuberkulinreaktion nach Roemer-Esch fur die frühzeitige Feststellung der Impftuberkulose der Meerschweinchen, unter besonderer Berücksichtigung des diagnostischen Tierversuches bei der menschlichen Tuberkulose, Fr. Graetz, Beitr. z. Klin, d. Tuberk., 1916, xxxvi, No. 2, 99. (transl. from Internat. Centralbl. f. d. ges. Tuberk. Forsch.)*

Intracutaneous Tuberculin Reaction in Infected Guinea pigs.—A positive reaction in an inoculated guinea pig indicates that the infection has taken place, whereas a negative result does not prove the contrary. The autopsy alone is conclusive. Selter has inoculated guinea pigs subcutaneously with attenuated cultures or with small numbers (2-16) of virulent bacilli, and repeatedly found the intracutaneous test negative, whereas the autopsy revealed well marked tuberculous changes in various organs. In some animals the reaction was at first positive and became negative later. At autopsy, healed tuberculous lesions were found. The author takes this interesting phenomenon as proof for a spontaneous healing of tuberculosis in guinea pigs.

Kronberger opposes this view and explains the findings of Selter as due to the immunizing effect of the intracutaneous reaction. This effect had been studied by other investigators by means of the cutaneous reaction employed in various modifications.

In reply, Selter points out that some of his animals were subjected to the intracutaneous test but once, some only two or three times at long intervals, some not at all, and still the autopsy revealed healed tuberculous changes. He therefore sticks to his original opinion.—*Der Wert der Intrakutan-Tuberkulinreaktion bei Meerschweinchentuberkulose, Selter, D. med. Wochenschr., 1916, No. 3. Zur Bewertung der intrakutanan Tuberkulinreaktion, Kronberger, D. med. Wochenschr. Erwiderung zu den vorstehenden Bemerkungen, Selter, D. med. Wochenschr., 1916, No. 25. (transl. from the Internat. Centralbl. f. d. ges. Tuberk. Forsch, January, 1917, xi, No. 1.)*

Tethelin in Experimental Tuberculosis.—Tethelin, the active principle of the anterior lobe of the pituitary, was administered to tuberculous guinea pigs infected with virulent human tubercle bacilli subcutaneously in 25 mgm. doses on alternate days for eighteen days before and during early infection. It had no appreciable effect on the progress of the tuberculosis or on the duration of life of these animals. Tethelin administered subcutaneously in 25 mgm. doses daily to guinea pigs sensitized to tuberculosis by dead and living (avirulent) human tubercle bacilli had no appreciable effect on the development, recession, or rupture of intracutaneous tubercles produced by dead human tubercle bacilli nor on deep puncture wounds of the skin in these animals.—*Effect of Tethelin on Experimental Tuberculosis, H. J. Corper, J. Inf. Dis., September, 1917, xxi, No. 3, 269.*

Cutaneous Tests with Human and Bovine Tuberculin.—The work here reported was done for the Local Government Board, London. Bacterial reports were made on 116 cases of children suffering from tuberculous bone or joint disease. As a matter of interest it was decided to undertake a quantitative investigation of the von Pirquet cutaneous test on such of these patients as were available, to check the reactions by color-photographs and to endeavor to ascertain: (1) Whether the reaction to cutaneous inoculations of tuberculin was constantly present in patients suffering from undoubted tuberculous lesions of the bones or joints, that is, in patients from whose lesions the tubercle bacilli had been isolated. (2) If not constantly present, under what circumstances the reaction would not appear. (3) Whether the degree of reaction gave any indication of the severity of infection. (4) The extent and nature of the reaction. The von Pirquet test was applied to 80 out of the 116 cases. In order to avoid any risk of unconscious bias, the inoculations were made and results recorded without the knowledge of bacteriological reports as to the type of bacillus found. The tuberculins employed were Koch's old tuberculin, prepared from the human type of bacilli and his tuberculin prepared in identical way from bacilli of bovine origin. The tuberculins were applied to suitable skin scarifications in dilu-

tions of $\frac{1}{4}$, $\frac{1}{16}$, $\frac{1}{4}$, and in full strength, each in approximately equal bulk, and controlled by inoculation of a scarification with the same quantity of sterile normal saline solution. In the majority of cases the scarifications were made on the anterior surfaces of both thighs; where the legs were not available both arms were used. In every case a minimum distance of at least 2 inches existed between any one scarification and its nearest fellow, so that adjacent reactions should not become confluent. To minimize the possibility of tuberculin applied to one scarification being conveyed by the lymphatic channels to a neighbouring scarification which had been treated with a weaker solution, the solutions, commencing with the control, were applied to the scarifications in increasing strength from the distal to the proximal extremity of each limb. Human tuberculin was always applied to scarifications on the right side of the body and bovine tuberculin to scarifications on the left side. The control solution and the tuberculins were all applied to the scarification marks with sterile glass eye-rods of the same size, a separate rod being kept in each bottle. In this way approximately the same quantity of liquid was applied to the center of each scar. The solution was simply placed on the scar, not rubbed in. The bottles containing the solutions of tuberculin were all placed on one tray in ascending order of strength. On the right-hand side of the tray was the human tuberculin, on the left the bovine. In the middle was the bottle containing the control solution. The bottles had distinguishing colored labels as a further safeguard against the possibility of introducing the wrong solution into the various scarifications. The final result of the investigation may be stated briefly as follows: (1) Local reactions to inoculations of both human and bovine tuberculin were invariably present in all patients from whose pus tubercle bacilli had been isolated. (2) Though reactions were invariably present the degree of reaction varied within wide limits. (3) Weakly and cachectic patients usually reacted feebly, quite irrespective of differences in the severity of their local lesions. (4) Strong and vigorous patients exhibited wide differences in the degree of their reactions, irrespective of differences in the extent or the severity of their local lesions. (5) The quantitative von Pirquet test was not found to be of value in forming an estimate of the severity of the infection, and was of little prognostic value. (6) It was impossible to differentiate the type of tubercle bacillus with which the patient was attacked by the nature of the reaction of the tuberculin employed.—*A Comparative Study of the Reactions to Human and Bovine Tuberculin Applied by the Method of von Pirquet in Cases of Tuberculous Disease of Bones and Joints, H. J. Gauvain, Lancet, October 6, 1917, ii, No. 4910, 519.*

The Blood in the Lungs.—The capillaries of the lung are capable of great passive variations in capacity. This fact enables the lung to act as a sort of reservoir for one side of the heart. Any excess of output on the right side that cannot be dealt with promptly by the left heart is temporarily taken up by the wide lung capillaries, which offer very little resistance. Some idea of the extent of these variations is given by the current textbook statements. Thus, whereas at the height of inspiration the blood contained in the lungs is about one twelfth of the whole blood in the body, this amount is diminished during expiration to between one fifteenth and one eighteenth, and by forcible artificial inflation of the lungs may be lessened to one sixtieth. In a recent experimental reinvestigation of the content of blood in the lungs in animals, however, Kuno, of the Japanese Medical School at Mukden, has found that the amount is much larger than earlier authors have recorded. It varies from 9 to 19 per cent of the total amount of blood. The amount of blood in the lungs increases with the acceleration of the circulation, that is, the amount of blood is about 2.2 times larger when the circulation is fast than when it is slow. When the lungs are edematous they may contain about one-quarter of the whole blood, although the circulation is very slow The time needed for the blood flow in the lungs is also more than twice as great when the circulation is slow than when it is fast. These observations, says Kuno, agree well with the necessities of life, since the amount of blood which comes in contact with the alveolar air may be directly proportional to the rapidity of the blood flow, or even increase in a higher ratio.—*Editorial, J. Am. M. Ass., November 10, 1917, lxix, No. 19, 1614.*

Giant Cells in Tuberculosis.—Sections of tuberculous glands from an experimental guinea pig have been studied and the formation of the giant cells followed. The giant cell of tuberculosis is formed in an identical manner with those arising after the introduction of foreign bodies into tissues. The nuclei are derived from the absorption of nuclei or fragments of nuclei of polynuclear leucocytes by macrophages. The chromatin after absorption reforms a nucleus and the macrophages then become

giant cells. The arrangement of the nuclei in a circular group is a secondary phenomenon and appears only in the older giant cells.—*Note Sur La Formation Des Cellules Géantes Dans La Tuberculose Par Caryoanabiose, A. Guieysse-Pellissier, Compt. Rend. Soc. Biol., February, 17, 1917, lxxx, No. 4, 187.*

Cytology of Tuberculous Serous Effusions.—Is tuberculosis capable of modifying in a lymphocytic way a cytological formula of an effusion to which it has no causal relationship? While cells in different effusions are found to vary, a succession of various cells is always the same and it is the evolution of a cellular picture which should be considered.

Two sets of rabbits were used for the experiment one with a localized glandular tuberculosis, the other being normal. One cc. of saturated salt solution was injected into the pleural cavity of all the rabbits and the cellular picture of the effusions compared after varying lengths of time. The following conclusions were made.

1. The cytological formula is not the same in the tuberculous animals as in the normals, mononuclear leucocytes being relatively more numerous in the effusions in the tuberculous animals.
2. A general evolution of a cellular formula appears to be the same in both series.
3. From clinical experience the same results may be postulated for effusions in the meninges, joints and peritoneum.
4. These findings would probably be true of serous effusions in human beings.
5. Tuberculosis influences the cellular picture of an effusion even though having no causal relationship, but clinically the differences are not well marked and of little importance.—*Réchèrches expérimentales sur la formule cytologique des épanchements des séreuses chèz les tuberculeux, J. Golay, Rev. méd. de la Suisse Rom., June 6, 1917, xxxvii, No. 6, 337.*

Cholesterol in Pleural Effusion.—Arnell found cholesterol crystals numerous in the effusions in the right pleura in a man of 25 with minor signs of pulmonary tuberculosis. The pleurisy had a chronic tendency but, notwithstanding the persistence and recurrence of the effusion through six years, the general health kept good and the cholesterol crystals did not seem to cause many subjective symptoms. The crystals glistened in the effusion, as there was up to 0.41 per cent cholesterol. The albumin content reached 5.23 per cent. The fluid was sterile. The effusion had developed after a spontaneous pneumothorax and had evidently been encapsulated by the pleura.—*Cholesterol in Pleural Effusion, T. Arnell, Hygiea, August 16, 1917, lxxix, No. 15.*

The Iodoreaction in Pulmonary Tuberculosis.—This is a color reaction produced by adding 2 or 3 drops of a 5 per cent alcoholic iodine solution or of Gram's iodine to 15 to 20 cc. of urine in a test tube. The reaction is not affected by the presence of albumen, excess of uric acid, urea, sugar or other pathological elements. Acid and alkaline urines show the reaction equally well. In a large number of normal urines the reaction was found to be always negative. In pathological conditions the following results were obtained: Tuberculosis of the mediastinal glands, 22 cases, all negative; cervical glands with fever, 2 cases, 1 positive; pulmonary tuberculosis, closed cases, 40 patients, 2 slightly positive; open cases, 52, 23 negative, 18 positive, 4 strongly positive, 7 slightly positive. The positive cases in general were in poor condition while the negative were in good condition. Advanced cases, cachectic, 8, all positive to strongly positive. Pleurisy, 14 cases, 9 positive and 5 negative. The positive were all febrile and in worse condition than the negative. Peritonitis, 3 cases, 1 positive. Surgical tuberculosis, usually negative. If positive, the cases were advanced.

These results were confirmed by a series of 76 cases from the Sanatorium Sotiria.

The conclusion is drawn that the appearance of the iodoreaction in a tuberculous patient is a bad prognostic sign and indicates a rapid development of the disease.

Other acute diseases: In typhoid fever the reaction appears early before the Widal or Ehrlich reactions. In 8 cases of grippe, 2 were slightly positive. In paratyphoid the reaction was always negative. In 5 cases of relapsing fever the results were negative.

The reaction is always present when the Moriz-Weisz reaction is positive and sometimes when the latter is absent. The same is true of the Ehrlich diazo reaction. The various antipyretic drugs do not cause the iodoreaction to appear with the exception of cryogenine which may give a coloration somewhat similar. Neosalvarsan-treated patients may sometimes show a slight reaction. The iodine forms a chemical combination with some substance in pathological urines so that free iodine cannot be recovered after the reaction.

The author concludes that the reaction is of importance in prognosis in pulmonary tuberculosis and in the early diagnosis of typhoid fever.—*L'iodoreaction, une nouvelle*

réaction urinaire pour le prognostic de la tuberculose pulmonaire et le diagnostic de la fièvre typhoide, M. Petzetakis, Arch. de Méd. Expér., March, 1917, xxvii, No, 4, 435.

Lymphocytes and Tuberculosis.—A diagnostic test of value for the earlier detection—two weeks instead of a possible six—of tubercle bacilli in urine (or in sputum when unrevealed by the microscope) has been introduced by Morton and Murphy and quite recently confirmed by McGraths.

This test is one of the first practical results to emanate from the long studies which have been followed on the relationship of the lymphocytes to tuberculous infection.

Murphy and Ellis, in 1914, showed that white mice submitted to X-ray exposure became less resistant to the inoculation of bovine tubercle bacilli. They argued that the destruction of the lymphocyte elements (12,000 white corpuscles of which 40 per-cent were lymphocytes were reduced to 4,000 at the expense of the lymphocytes) accounted for the lowered resistance of the mice to tubercle infection.

Bartel was one of the first investigators to call attention to the defensive action of the lymphocyte to tubercle infection although almost constant presence of the lymphocytes in tubercle formation had long been known. Opie's investigations also suggested the importance of the lymphocyte defense. Marie and Fiessinger made the discovery that the lymphocytes contain a ferment (lympholipase) capable of splitting wax and fat into glycerine and fatty acid. Since 30 per cent by weight of the body of the tubercle bacilli is composed of waxy substance, the bearing of the lympholipase can be understood.

It would appear that the effect of X-ray exposure on an animal would depend upon the dosage administered. Small doses will stimulate the production of more lymphocytes, whereas large doses or frequently repeated X-ray exposures will reduce and destroy the lymphocytes.

The injections of urine suspected of containing tubercle bacilli must be made into the peritoneal cavity and not subcutaneously because in the former situation the few bacilli present will probably multiply more quickly and before the response of lymphocyte proliferation which is apt to follow the lymphocyte destruction. Experiments will, no doubt, be carried on to find out whether the X-ray in small repeated doses can increase the resistance of laboratory animals to tubercle infection. Webb and Williams, following their discovery of the increased production of lymphocytes at a high altitude, were able to show that artificial hyperemia of the marrow in rabbits would cause a decided lymphocytosis and also an increased protection to bovine tubercle infection.—*Editorial, J. Lab. and Clin. M., September, 1917, ii, No. 12, 919.*

Tuberculosis, Cancer, and X-Ray.—In 1914, Lewis and Margot published the observation that mice experimentally infected with bovine tubercle bacilli developed splenic enlargement. They also observed that animals splenectomized three weeks before infection with tubercle bacilli were more resistant than normal animals. In the same year, Murphy and Ellis stated their belief in the conception that the lymphocyte is an important factor in resistance to tuberculous infection. In an unpublished study, Lang and Murphy, studying the blood changes following splenectomy, showed that immediately after splenectomy the total lymphocyte count falls, but that it then commences to rise until by the nineteenth to the twenty-first day 75 per cent of the animals (50 mice) showed an average increase of 11,000 lymphocytes per c.mm.,—a gain of 100 per cent above the normal count. They thought it probable that the lymphocytosis might be a factor in causing the greater resistance displayed by the splenectomized animals. A recent series of experiments confirms this view. These experiments showed that mice splenectomized and then exposed to repeated small doses of X-ray, which affects primarily the lymphoid organs, were more susceptible to infection than normal animals, or animals which had only been splenectomized. Also, Morton has observed that X-rayed guinea-pigs are more susceptible to infection with the human type of tubercle bacilli than normal animals.

The recent experiments reported by Taylor and Murphy also attack the problem in another way. Murphy and Morton had previously shown that mice previously immunized against, and then inoculated with, a transplantable mouse carcinoma, develop a marked lymphocytic reaction which lasts several weeks. They, therefore used such cancer immune animals and inoculated them with tuberculosis, with the result that they showed a greater resistance to bovine tuberculosis than controls. On the other hand, if in cancer immune mice the lymphocytosis is prevented or removed by X-rays, the resistance to tuberculosis is removed.

Taylor and Murphy say that they did not undertake the experiments with the idea of establishing a relationship between cancer and tuberculosis, although it has been believed that an antagonism between the

two exists. Their experiments, however, suggest the basis for the popularized belief, which is probably based upon exceptional cases in which the two diseases have coexisted.

The interesting fact seems to be that in both tuberculosis and cancer the lymphoid tissue of the body may be a determining factor in resistance and yet the *modus operandi* involved may be absolutely different.—*Editorial, J. Lab. and Clin. M., September, 1917, ii, No. 12, 923.*

Value of Arneth's Leucocyte Count.—The following practical conclusions may be drawn: Where there is much levodeviation no great permanent benefit may be anticipated from treatment beyond a prolongation of life. Should levodeviation be absent, even with an extensive lesion, the probability is that the disease will progress to chronicity. There are cases where an active process with levodeviation may develop into a smoldering fibrosis with improvement in the leucocyte count, and this process seems to be favored by the administration of tuberculin. An investigation of the nuclear count of the leucocytes by Arneth's method can render valuable aid in prognosis.—*Value of Arneth's Leucocyte Count in Pulmonary Tuberculosis, F. E. Taylor and H. Wilson, Brit. J. Tuberc., July, 1917, xi, No. 3, 112.*

Clinical Value of Blood Pressure in Tuberculous Patients.—The blood pressure when frequently taken has not merely a purely scientific and theoretical interest. It has a considerable practical value from the point of view both of diagnosis and of prognosis. Hypotension has been supposed to have great value in the beginning of tuberculosis, and Potain even went so far as to say that "every subject in middle life, who does not present any acute disease or apparent reason to account for cachexia or nervous exhaustion, should be considered suspect of tuberculosis when the tension of the radial artery is below 140 mm." Reymond has found marked hypotension with permanent tachycardia in hospital patients presenting symptoms of anemia without offering any explanation for these phenomena either in auscultation of the lungs or in the sputum, since this was in small amount and did not contain the bacillus of tuberculosis. Soon physical signs appeared, however, which distinctly showed that the patients were tuberculous. Other writers have observed the same facts. Although in some patients there is a marked hypotension, in others there is very marked hypertension, reaching in some as high as twenty to twenty-three millimetres, so that the diagnostic value of hypotension must not be exaggerated. It is a good sign when it exists and it is unfortunate that it is not as constant as many have supposed.

During the progress of an undoubted tuberculosis, the blood pressure indicates the possibility of certain complications when it offers rather sudden variations. If hypotension appears suddenly, attention should be directed to the heart. When it occurs without any evident immediate cause, it is usually symptomatic of a myocarditis or a neuritis of the pneumogastric. If, on the contrary, in a case of advanced tuberculosis, where the tension should be considerably decreased on account of the rapid progress of the intoxication and evolution of the lesions, if a normal or even increased pressure is found, it should lead to the examination of the urine for evidences of a nephritis. Papillon has pointed out the value of almost normal pressure as a diagnostic means in cases of chlorobrightism with commencing tuberculosis.

Hypotension means a bad prognosis, but this alone must not lead one to conclude that the evolution of the lesions is rapid, because in some cases the tuberculous process improves and at the same time the pressure increases. Hypotension is only of bad omen when it has a tendency to increase and is constant. It indicates a more serious prognosis when it is found early in the process since it shows that the patient is without resistance, that the intoxication is severe, or that the heart is organically or functionally diseased to a serious extent. The blood pressure is merely a factor in the appreciation of the prognosis and of the gravity of the case, but it does not detract from the importance of the other factors. Hypotension or normal tension usually allows one to foresee an evolution toward amelioration or even cure, unless the case is complicated by nephritis.

The tuberculous patients who live long are those in whom there is an integrity of the size of the heart or a hypertrophy together with a tendency toward increase in the blood pressure. Generally speaking, it may be said that patients who recover are those in whom the blood pressure increases; in other words, the tension rises in direct relation to the general improvement health.—*Editorial, N. York M. J., October 6, 1917, cvi, No. 14, 661.*

BOOKS

The Battle With Tuberculosis and How to Win It. A Book for the Patient and His Friends. By D. MacDougall King, M.B. 1917. 258 pages. J. B. Lippincott Company, Philadelphia and London.

It is evident that semi-popular works on tuberculosis are appearing in sufficient numbers to educate the public fully on its cause, prevention and treatment. This book is by a patient, himself a physician and therefore keenly interested to contribute from his experience. The style is strongly military. War similes abound and flavor the whole book; in fact the chapters are named by military headings.

The descriptions of the battle with the bacillus reveal the serious struggle through which the writer himself went to recover his health. Being a Canadian he could be expected to use warlike expressions with greater freedom at this time. The body of the book contains generally recognized and sound information on tuberculosis in untechnical language.

On page fifteen the bacillus is represented as able to resist twenty-four hours' submersion in five per cent phenol, which, without qualification, sounds improbable and discouraging. The insidious development and progress of the disease is well portrayed.

The advice as to the selection of medical aid is excellent; likewise the information about life in sanatoria and the routine of treatment and diet. The author believes in change of climate and the value of altitude, but gives wise caution about the expense and dangers of journeys to distant resorts.

Specific treatment, tuberculin and other vaccines are explained in metaphor and conservatively recommended. Autoinoculation is included in the same chapter and aptly described. Artificial pneumothorax is also included under "Special Weapons."

Less valuable material appears in the last few chapters where the author includes some explanations (illustrated) of brain fag or emotional exhaustion based on the theories of a well-known surgeon. Otherwise the work is instructive and conveys sound information, though with a profusion of martial expressions.

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*"The Choice of Tuberculins," by Benjamin White, Otisville, N. Y., Department of Health, City of New York. Read at the annual meeting of the Medical Society of the State of New York, at Saratoga Springs, May 18, 1916.

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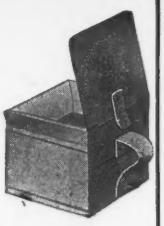

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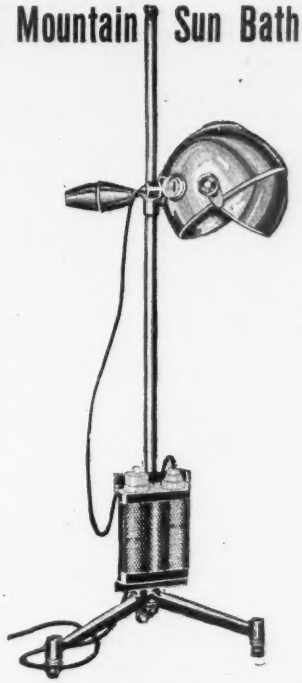

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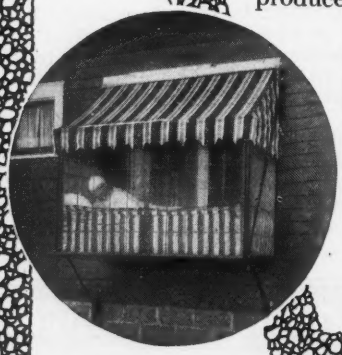

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